

1 SECTION 21 01 00

2 FIRE SUPPRESSION REQUIREMENTS

3 PART 1 GENERAL PROVISIONS

4 1.01 APPLICABLE PROVISIONS

5 A. Drawings and general provisions of contract, including general and supplemental
6 conditions and Division 01 specification sections, apply to work under this
7 Section.

8 B. This Section applies to all Division 21 sections of plumbing.

9 C. The Contractor performing the work of this Section applies to the pipe fitter
10 licensed and certified per the State of Wisconsin requirements.

11 1.02 APPLICABLE PUBLICATIONS

12 A. Publications, standards and listing requirements called out in the Sections of this
13 Division of Labor shall form a part of these specifications as if contained herein.

14 B. The requirements of the Contract Documents, including the General Conditions,
15 and Supplementary Conditions, and Division 01 - General Requirements, apply to
16 this section except as modified herein.

17 1.03 DESCRIPTION OF WORK

18 A. Requirements of Instructions to Bidders Conditions of Contract and Division 01 -
19 General Requirements apply to Work under this Division, which shall include:

- 20 1. Section 21 01 00 – Fire Suppression Requirements
21 2. Section 21 05 05 – Through-Penetration Firestopping
22 3. Section 21 10 00 – Automatic Water Base Sprinkler System

23 B. Work Included:

- 24 1. The work covered by this Division of the specifications includes the
25 furnishing of all labor, materials, tools, equipment, permits, certificates
26 and temporary connection necessary for or incidental to executing and
27 completing the fire suppression work to make the system ready for normal
28 and proper operation, including all work or materials not directly shown
29 on the drawings or in the specifications, but necessary for the proper
30 operation of the system.
31 2. All work shall be as specified and indicated on the drawings unless
32 specifically excepted on the drawings or herein and in compliance with the
33 State of Wisconsin Uniform Building Code, NFPA standards, Local Codes
34 and Ordinances, Local Utility Regulations and OSHA.

3. All work shall be performed by individuals' license and certified per the State of Wisconsin requirements. Their work shall be performed to the satisfaction of the Architect / Engineer, and Owner.
4. Read all other Divisions of the Specifications which are applicable to this work, including the General Conditions section applicable to all bidders.
5. The Fire Suppression Requirements section is a supplement to and not a replacement for the project General Condition's section.
6. In cases of conflict with information in the General Conditions, the more stringent of the contract requirements shall be considered applicable.
7. Prior to submitting bid, call to the attention of the Fire Protection Engineer any material or apparatus believed to be inadequate or any necessary items or work omitted.
8. Address any questions regarding the interpretation of the plans and/or specifications at least 12 days before the bid opening.
9. The Fire Protection Engineer reserves the right to interpret his own specifications and plans after bids are received, and to demand that the installation conform to his intent.
10. Failure to become acquainted with existing conditions at the site shall in no way relieve the responsibility for making installation in conformance with plans and specifications without additional cost to the owner.

C. Examination of Plans, Specifications and Site:

1. Before submitting a bid, the bidder shall familiarize himself with all features of the building and site which may affect the execution of his work.
2. No extra payment will be allowed for the failure to obtain this information.
3. If there are omissions or errors in the plans or specifications, they shall be clarified with the architect prior to submitting bid.
4. For all remodeling projects, a site visit to the premises, for the purpose of the noting of all existing conditions which may affect work is required.
5. Knowledge of all existing conditions, which may affect work in a renovation project, shall be included in the preparation of bid.
6. Lack of information on existing conditions shall not be allowed for a valid cause for additional compensation.

D. Codes, Permits, and Inspection Fees

1. All work and materials shall conform in every respect to the current rules and requirements of the State of Wisconsin Uniform Building Code, NFPA standards, Local Codes and Ordinances, Local Utility Regulations and OSHA.
2. Give to the proper authorities all required notices relating to the project, obtain all official permits and licenses required, pay all fees incidental thereto, deliver upon completion of the work and without cost to the Owner all required certificates of inspection and approval.

- 1 3. Secure all local permits, utility fees and licenses applicable for the work
2 under this Division and pay all fees, including posting all bonds incidental
3 thereto. Plan review submittal to the State of Wisconsin Department of
4 Safety and Professional Services or its designated municipality, shall be
5 by the Contractor.

6 E. Scope of Work:

- 7 1. This specification for a fire protection system is a "Performance"
8 specification. It is intended to establish the design criteria for the work.
9 The Fire Protection Contractor shall assume full responsibility for the
10 design and details to meet the requirements of the State of Wisconsin,
11 local municipality, NFPA Codes, H.S.S. Code and Factory Mutual I.R.I.
12 or Owners insurance service.
13 2. Furnish all labor, materials, equipment and performing all operations
14 necessary to install the automatic fire sprinkler system, including piping,
15 fittings, sprinkler heads, valves, controls, alarms, hangers and any other
16 supplemental items necessary to complete the system, as listed below:
17 a. Attain static pressure, residual pressure and available water supply
18 information of flow rates from the local Water Utility Department.
19 Any water supply information shown on drawings are preliminary
20 for bidding purposes.
21 b. Provide the required quantity of sprinkler heads in new or
22 remodeled areas as defined in the specifications.
23 c. Examine architectural and structural drawings and details. If you
24 feel that you cannot install the piping in the spaces provided, notify
25 the Architect, in writing, before submitting a bid for the work.
26 d. Provide a new hydraulically designed sprinkler system for the new
27 addition and connect to existing system as required.
28 e. Revise existing sprinkler system in areas that are to be remodeled
29 by relocating existing sprinkler heads and adding new sprinkler
30 heads as required.

31 1.04 RELATED WORK ELSEWHERE

- 32 A. Thoroughly inspect entire set of plans and specifications as to the class of
33 building construction in general and specifically to the items of other divisions
34 that affect the work of this Division.
35 B. Work of this Division also includes any plumbing work shown on the drawings
36 and included in the specifications of other Divisions.
37 C. Drawings and specifications of the work under this Division are intended for a
38 complete project. If trade jurisdiction requires portions of the work be done by
39 other tradesmen, this Division's contractor shall sublet those portions of the work
40 to qualified contractors, however this Division's contractor shall be held fully
41 responsible for all such installations.

1.05 SHOP DRAWINGS

- A. Submit shop drawings for all equipment and systems as indicated in the specification. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents.
- B. Submit electronic files with dimensions, capacities, and information as soon as available from the list of acceptable manufacturers.
- C. Shop drawings shall include, but are not limited to, the following items:
 - 1. State Approved Fire Suppression Drawing, Specifications and Hydraulic Calculations.
 - 2. Sprinkler Heads
 - 3. Flow switch
 - 4. Pipe, Fittings, and Valves.
 - 5. Pipe Hangers / Support.
 - 6. Pipe Labels, and Valve Tags.
- D. The Architect, Engineer or its representative shall review and comments on all items being submitted and items to be installed. The Architect, Engineer or its representative holds the right to request submitted items to be revised and resubmitted or to reject a submitted item if it does not meet the conformity with the design concept of the work as established in the Contract Documents.
- E. All shop drawings, product data, and samples submittals shall illustrate details of the work, fixtures, equipment, materials, products, systems, designs or workmanship that this Division's contractor intends to use in order to comply with the design concept established in the Contract Documents. Review of these submittals by the Architect, Engineer or its representative is only for the limited purpose of checking for conformity with the design concept of the work as established in the Contract Documents, and is not intended to be for the purpose of determining the accuracy of other matters that may be contained in such submittals, including, but not limited to such matters as dimensions, quantities, performance of fixtures, equipment and systems design and installed, engineering and design, construction means, methods, techniques, sequences, procedures or safety precautions, the correctness of which as set forth in the Contract Documents or submittal shall be the sole responsibility of by this Division's contractor.
- F. Any flagged deviations on the shop drawings from the specified item and any approval of the shop drawings will not be considered acceptance of the deviation unless it's been explicitly flagged.

- 1 G. Where any specific fixture, equipment, materials, process or method of
2 construction is specified by name or by reference to the model number of a
3 manufacturer, the specifications are to be used as a guide and are not intended to
4 take precedence over the basic duty and performance specified or noted on the
5 drawings.

6 1.06 OPERATION & MAINTENANCE MANUALS

- 7 A. Submit operation and maintenance manuals following Section specific shop
8 drawing submittal guidelines.

- 9 1. Upon the complete installation of the work under this Division, this
10 Division's contractor shall provide the necessary qualified personnel for
11 operating the systems as directed by and scheduled with the Architect,
12 Engineer and the Owner. At this time, this Division's contractor shall
13 instruct the Owner or his representative in the operation, adjustment and
14 maintenance of all equipment furnished.
15 2. Provide (1) electronic and three (3) paper copies of maintenance manuals
16 shall be submitted, which shall present full details for the care,
17 maintenance, and operation of all equipment and systems.
18 3. Provide documentation in the operation and maintenance manual to
19 required testing of the work under this Division.

- 20 B. Record Drawings:

- 21 1. Record drawings shall be kept daily, noting all changes and available upon
22 demand.
23 2. Record drawings shall reflect any changes or pipe re-routing due to
24 construction phasing or existing field conditions.
25 3. Final record drawings shall be provided to Architect / Engineer and owner
26 at the completion of the project. Final record drawing shall be submitted in
27 electronic PDF form (not handwritten mark-ups) or recorded in CAD /
28 BIM format with the ability to extract an electric PDF.

29 1.07 QUALITY ASSURANCE

- 30 A. All products and materials used are to be new, undamaged, clean and in good
31 condition. Existing products and materials are not to be reused unless specifically
32 indicated.
33 B. Where equipment or accessories are used which differ in arrangement,
34 configuration, dimensions, ratings or engineering parameters from those indicated
35 on the contract documents, the Contractor is responsible for all costs involved in
36 integrating the equipment or accessories into the system and for obtaining the
37 intended performance from the system into which these items are placed.
38 C. Provide all necessary accessories required for a complete and operable system.

39 1.08 WARRANTY

- 1 A. The Work of this Division shall be guaranteed, in writing, to be free from defects
2 in materials and/or workmanship for one (1) year from the date of certificate of
3 completion and acceptance of the work. Necessary instruction and/or emergency
4 services to be performed as a result of defects in materials or workmanship shall
5 be furnished for one (1) year at no extra cost for labor or materials. If default
6 thereof, the Owner may have such work done and charge all applicable costs to
7 the Contractor.
- 8 B. Furnish manufacturer's written warranties on all equipment to the Owner stating
9 effective date of warranty.
- 10 C. The warranty shall be comprehensive. No deductibles shall be allowed for travel
11 time, service hours, repair parts cost, etc.

12 PART 2 PRODUCTS

13 2.01 GENERAL

- 14 A. It is the intent of these specifications that all the necessary material, apparatus,
15 and devices to complete the installation as specified herein, except such parts as
16 are specifically accepted, shall be provided.
- 17 B. If an item is either shown on the drawings or called for in these specifications,
18 shall be considered sufficient as an item part of this contract.
- 19 C. All materials, products, fixtures and equipment shall be an approved product per
20 the State of Wisconsin Department of Safety and Professional Services.
- 21 D. All sizes given are as minimum.
- 22 E. Material and labor shall be first class and workmanlike and to the satisfaction of
23 the Plumbing Engineer and shall be subject to inspection test and approval at all
24 times from commencement until acceptance of completed work.
- 25 F. Manufacturers shall be responsible for providing material listed by U.L. or other
26 approved agencies, and all governing codes and ordinances.
- 27 G. All material must bear U.L. and/or other approved labels where possible.
- 28 H. Items specified by catalog number or brand name and approval of shop drawings
29 will not relieve the manufacturer of this responsibility.

30 2.02 CONTINUITY OF EXISTING SERVICES

- A. Do not interrupt or change existing services without prior written approval from the Owner's construction representative. When interruption is required, coordinate scheduling of downtime with the Owner to minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.
- B. The Contractor shall notify building occupants and also local fire authorities of any shutdowns of the existing fire protection system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify fixtures and equipment are in compliance with approved submittal drawings.

3.02 FIELD MEASUREMENTS

- A. Field verify all measurements. Do not base on drawings.
- B. Identify conflicts with the work of other trades prior to installation of work.
- C. Adjust system to satisfy field requirements.

3.03 DELIVERY, STORAGE AND HANDLING

- A. Receive, sign for and store all equipment in this section.
- B. Maintain original quality and condition of equipment while it is in storage.

3.04 INSTALLATION

- A. General:
 - 1. The complete installation of the work under this Division shall be done in a neat, workmanlike manner in accordance with all applicable codes and the manufacturer's recommendations.
 - 2. Install all materials, assemblies, fixtures and equipment in per the manufacturer's recommendations and requirements. Consult manufacturer as required for missing information and technical advice of that product.
- B. Diagrams, Measurements, Final Layout Drawings:
 - 1. Drawings show the layout in general and approximate locations of piping, major equipment, etc., and shall be followed as closely as the actual construction of the building, work of other trades, and the locations of equipment will permit.

2. All changes from the drawings necessary to make the work under this Division conform to the building as constructed and to fit the work of other trades shall be made without extra cost.
3. Drawings for the work under this Division shall not be scaled for exact dimensions. Consult the architectural and structural drawings and details for all dimensions and location of the work under this Division.

C. Protection of Finished Work and Materials:

1. Protect all materials and work performed under this Division from damage or injury that may be caused by other workmen and from the action of the elements.
2. Protect the materials and work performed by other Divisions, and the Owner's property from damage or injury arising from work under this Division.
3. Keep all piping and equipment capped, plugged, drained, or otherwise protected including protection from freezing and by stoppage from building materials, sand or dirt, mortar, concrete, etc.

D. Cleaning and Finishing:

1. After all work under this Division have been made and the system pronounced as satisfactory, this Division's contractor shall go over all his work and clean equipment, fixtures, piping, etc. and leave clean and in complete working order at final completion of the building.
2. The putting of new work, or any part thereof, into use, even though with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor shall it be construed to obligate him, in any way, to accept improper work or defective material.

E. Cooperation with Other Divisions and the Owner:

1. Give full cooperation to other trades and furnish any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference or delay.
2. The Work of this Division must be coordinated with the work of other Divisions and the Owner to prevent interference. Any necessary changes to be made because of the lack of proper coordination shall be performed without extra charge.
3. Where the work of this Division will be installed in close proximity to the work of other trades, or where there is evidence that the work of the Contractor will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment.
4. If the Contractor installs his work before coordinating it with other trades, he shall make necessary changes in his work to correct the condition without extra charge.
5. Provide all service connections under the jurisdiction of the work under this Division to Owner's equipment or equipment furnished by other Divisions as required for a complete and operating installation.

1 F. Supervision:

- 2 1. Provide the services of an experienced superintendent who shall be
3 constantly in charge of all the work included in or related to this Division.

4 G. Substitutions:

- 5 1. All costs, as a result of submitted substituted items by the Contractor and
6 with the approval by the Architect or Engineer, including costs required
7 under other Contracts, shall be the responsibility of the Contractor
8 requesting the substitution. None of the extra costs resulting from such
9 approval shall evolve upon the Owner, the Architect, other Consultants, or
10 other Contractors.

11 3.05 OWNER TRAINING

- 12 A. Provide as outlined in each specification section requiring owner training.

13 3.06 SPARE EQUIPMENT (NONE)

14 END OF SECTION

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SECTION 21 05 05

THROUGH-PENETRATION FIRESTOPPING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Contractor (EC, MC, PC or FPC) shall reference specification Division 07 for all firestopping materials and requirements.
- B. All penetrations through fire and/or smoke rated walls required by this contractor shall be utilizing sleeves or openings dedicated to the contractor's systems. This contractor shall coordinate with the Firestopping Contractor to ensure that the sleeve, conduit, or opening fill is not exceeded for the planned firestopping system. Do not share sleeves, openings, or penetrations that require firestopping with other trades.
- C. All firestop materials shall be furnished and installed by a dedicated Firestopping Contractor, costs for which shall not be born by this contractor.
- D. The intent is that this contractor shall identify and coordinate all penetrations through fire barriers with the Firestopping Contract.
- E. The contractor (EC, MC, PC or FPC) shall indicate what type of material, system, or product will penetrate each fire/smoke rated assembly to ensure that there is a UL Listed firestop assembly that will restore the listed fire/smoke rating to the element being penetrated.

END OF SECTION

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1 SECTION 21 10 00

2 AUTOMATIC WATER BASE SPRINKLER SYSTEM

3 PART 1 GENERAL PROVISIONS

4 1.01 APPLICABLE PROVISIONS

- 5 A. Drawings and general provisions of contract, including general and supplemental
6 conditions and Division 01 specification sections, apply to work under this
7 Section.

8 1.02 DESCRIPTION OF WORK

- 9 A. Furnish and install a complete and operable system as indicated on the drawings
10 and as specified herein.

11 B. Materials:

- 12 1. Materials shall conform to the standard prescribed in the Wisconsin
13 building and fire Codes and be approved for use by the Department of
14 Safety and Professional Services, Division of Technical Services. When
15 required, Fire Protection Contractor shall obtain approval prior to
16 installation.
17 2. All materials and equipment required for the work shall be new, of first-
18 class quality and shall be furnished, delivered, erected, connected and
19 finished in every detail and shall be so selected and arranged as to fit into
20 the building spaces.

21 C. Materials Not Included:

- 22 1. N/A.

23 1.03 SHOP DRAWINGS

- 24 A. Submit electronic files with dimensions, capacities, and information as soon as
25 available from manufacturers.

26 1.04 QUALITY ASSURANCE

- 27 A. All materials and parts shall be new and unused of current manufacture.
28 B. Provide all necessary accessories required for a complete and operable system.

29 1.05 WARRANTY

- 30 A. Materials and workmanship shall be warranted for a period of not less than (1)
31 year from the date of commissioning against defects in material and
32 workmanship.

- 1 B. The warranty shall be comprehensive. No deductibles shall be allowed for travel
2 time, service hours, repair parts cost, etc.
- 3 C. The warranty shall not deprive the Owner of other rights the Owner may have
4 under other provisions of the Contract Documents and will be in addition to and
5 run concurrent with other warranties made by the Contractor under the
6 requirements of the Contract Documents.

7 PART 2 PRODUCTS

8 2.01 PIPE AND FITTINGS

- 9 A. Steel Pipe: Black steel pipe welded and seamless, Grade A, ASTM A53; black
10 welded and seamless steel pipe for fire protection use, ASTM A795; electric
11 resistance welded steel pipe, Grade A, ASTM A135.
- 12 1. Schedule 40 for welded, rolled groove, cut groove and threaded. Schedule
13 30 for welded, rolled groove, 8" and larger cut groove and 8" and larger
14 threaded piping. Schedule 10 up to and including 6" for rolled groove and
15 welded. 0.188" for 8" and 10" rolled groove and welded.
- 16 2. Fittings 1-1/4" and Under - Cast iron threaded fittings, Class 125 or 250,
17 ASTM A126/ANSI B16.4. Malleable iron threaded fittings, Class 150 or
18 300, ASTM A197/ANSI B16.3.
- 19 3. Fittings: 1-1/2" and Over - Standard weight seamless carbon steel weld
20 fittings, ASTM A234 grade, ANSI B16.9. Mechanical grooved fittings
21 with EPDM gaskets, ASTM A536 ductile iron, ASTM A47 malleable iron
22 or ASTM A53 fabricated steel.
- 23 4. Finish: Hot dipped zinc coated (galvanized) finish on piping and fittings
24 used in dry pipe systems, pre-action systems, piping exposed to weather
25 and piping exposed to corrosive environments where indicated.
- 26 B. Piping and fittings shall be anchored, clamped and rodded as required by the
27 Architect, Engineer, and NFPA Codes.

28 2.02 UNIONS AND FLANGES

- 29 A. Unions, flanges and gasket materials to have a pressure rating of not less than 175
30 psig.
- 31 B. 2" and Smaller Steel: ASTM A197 ANSI B16.3 malleable iron unions with brass
32 seats. Use black malleable iron on black steel piping and galvanized malleable
33 iron on galvanized steel piping.
- 34 C. 2" and Smaller Copper: ANSI B16.18 cast bronze union coupling or ANSI
35 B15.24 Class 150 cast bronze flanges.

- 1 D. 2½” and Larger: ASTM A181 or A105, Class 150, grade 1 hot forged steel
2 flanges of threaded, welding neck, or slip-on pattern on black steel and threaded
3 only on galvanized steel. ANSI B16.1 or ANSI B16.5, Class 150 cast iron
4 threaded flanges. Use raised face flanges ANSI B16.5 for mating with other raised
5 face flanges or equipment with flat ring or full face gaskets. Use ANSI B16.1 flat
6 face flanges with full face gaskets for mating with other flat face flanges on
7 equipment.

8 2.03 MECHANICAL GROOVED PIPE CONNECTIONS

- 9 A. Mechanical grooved pipe couplings and fittings, as manufactured by Viking,
10 Victaulic, ITT Grinnell, Stockham or Gustin-Bacon may be used with cut steel
11 pipe. Couplings and fittings to be malleable iron, ASTM A47, or ductile iron
12 A536.
- 13 B. All mechanical grooved pipe material including gaskets, couplings, fittings, and
14 flange adapters to be from the same manufacturer.
- 15 C. Gaskets shall be EPDM, ASTM D2000. Heat treated carbon steel oval neck track
16 bolts and nuts, ASTM A-183, with zinc electroplated finish.
- 17 D. Couplings: Standard flexible couplings, Style 77, or lightweight couplings, Style
18 75. Reducing couplings are not acceptable.
- 19 E. Flanges: Flange adapter Style 741, except at lug type butterfly valves where
20 standard threaded flanges shall be used.
- 21 F. Fittings: Malleable or ductile iron elbows and tees of the manufacturer’s standard
22 line may be used in all sizes, except bullhead tees will not be accepted.

23 2.04 PIPE HANGERS AND SUPPORTS

- 24 A. Pipe hangers and supports shall be as manufactured by B-Line, Fee and Mason.
25 Grinnell, Pate Roof Products & Systems, Unistrut or approved equal.
- 26 B. Provide all supporting steel required for the installation of mechanical equipment
27 and materials, including angles, channels, beams, etc. to suspended or floor
28 supported equipment. All of this steel may be specifically indicated on the
29 drawings.
- 30 C. Hangers for pipe sizes ½” through 2” shall be carbon steel, adjustable swivel, split
31 ring or clevis.
- 32 D. Multiple or trapeze hangers shall be steel channels with welded spacers and
33 hanger rods.
- 34 E. Wall support for pipe sizes through 3” shall be cast iron hook and for sizes 4” and
35 over shall be welded steel bracket and wrought steel clamp.

- 1 F. Vertical support shall be steel riser clamp.
- 2 G. Floor support shall be painted steel pipe saddle, stand and bolted floor flange.
- 3 H. Steel hanger rods shall be threaded both ends, threaded one end, or continuous
4 threaded. Provide rods complete with adjusting and lock nuts.
- 5 I. Beam clamps shall be malleable black iron clamp for attachment to beam flange
6 to 0.62 inches thick with a retaining ring and threaded rod of 3/8, 1/2 and 5/8 inch
7 diameter. Furnish with a hardened steel cup point set screw or forged steel jaw
8 type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1½ inch
9 diameter.
- 10 J. Riser clamps shall be black carbon steel filled clamp in two section that are bolted
11 together around the pipe. Plastic or copper coat the clamps when used on copper
12 pipe.
- 13 K. Anchors: Use welding steel shapes, plates and bars to secure piping to the
14 structure.
- 15 L. Equipment Stands: Use structural steel members supported by pipe supports. All
16 steel exposed to the weather to be galvanized or stainless. All other steel to
17 receive prime and finish coat of rust inhibiting paint.

18 2.05 SLEEVES

- 19 A. Sleeves. Pipe sleeves to be Schedule 40 steel pipe flush with wall and ceiling
20 surfaces.
- 21 B. Seal all openings between pipe and sleeves with fiberglass and vinyl acrylic
22 plastic. For piping passing through fire walls, floors or ceilings, use 3-M Fire
23 Barrier CP-25 caulk and 303 putty synthetic elastomers, U.L. rated.

24 2.06 VALVES

- 25 A. Valves shall be as manufactured by Kennedy, Milwaukee, Nibco, Stockham,
26 Viking, Victaulic, ITT Grinnell, or equal, and must be approved and listed by UL
27 or FM if applicable.
- 28 B. Gate valves 2" and smaller shall be outside screw and yoke, 175 psig, bronze
29 body, bronze mounted, screwed bonnet, rising stem, solid wedge, with tamper
30 switch. Gate valves 2½" and larger shall be outside screw and yoke, 175 psig,
31 cast iron body, bronze mounted, bolted bonnet, rising stem, solid wedge, with
32 tamper switch.

- 1 C. Butterfly valves 2" shall be bronze body butterfly, 175 psig, geared operator,
2 visible position indicator, tamper switch, Buna or Viton seat, stainless steel disc
3 and stem. Butterfly valves 2½" and larger shall be cast or ductile iron body
4 butterfly, lug style, 175 psig, geared operator, visible position indicator, tamper
5 switch, EPDM resilient seat, EPDM seals, nickel plated ductile iron disc. Valve
6 assembly to be bubble tight to 175 psig with no downstream flange/pipe attached.
7 Use cap screws for removal of downstream piping while using the valve for
8 system shutoff.
- 9 D. Check valves 2" and smaller shall be bronze body, threaded end, Y-pattern,
10 regrindable bronze seat, renewable bronze disc, 175 psig, suitable for installation
11 in a horizontal or vertical line with flow upward. Check valves 2 ½" and larger
12 shall be cast or ductile iron body, flanged or grooved ends, bronze trim, bolted
13 cap, renewable bronze seat and disc, 175 psig, suitable for installation in a
14 horizontal or vertical line with flow upward.
- 15 E. Spring loaded check valves 2" and smaller shall be bronze body, threaded ends,
16 bronze trim, stainless steel spring, stainless steel center guide pin, 175 psig, teflon
17 seat unless only bronze available. Spring loaded check valves 2½" and larger shall
18 be cast or ductile iron body, wafer or globe type, bronze trim, bronze or EPDM
19 seat, stainless steel spring, stainless steel stem if stem is required, 175 psig.
- 20 F. Air pressure maintenance device: Automatic control capable of maintaining
21 system air pressure, rated for 175 psig, adjustable air pressure range of 15 to 60
22 psig, complete with isolation valves, bypass fill valve, pressure regulator, or
23 pressure switch and strainer.
- 24 G. Drain valves shall be ½" two or three piece bronze body ball valve: threaded ends,
25 chrome plated bronze ball; glass filled teflon seat; teflon packing and threaded
26 packing nut; blowout-proof stem; 400 psig WOG, with hose thread outlet and cap.
- 27 H. All valves controlling the water supply for automatic sprinkler systems and water
28 flow switches on all sprinkler systems shall be electrically supervised. Alarm,
29 supervisory and trouble signals shall be automatically transmitted to an approved
30 supervising station per NFPA 72.
- 31 I. Supervisory/tamper switches, for OS&Y valve or butterfly valve installations,
32 UL/FM listed/approved, to monitor position of valve, tamper resistant cover
33 screws, single or double SPDT switch contacts, corrosion resistant, for indoor or
34 outdoor use, NEMA 4 & 6P enclosures.

35 2.07 FLOW SWITCHES

- 36 A. Vane type UL approved waterflow switch with metal enclosure, adjustable
37 pneumatic retard and electrical characteristics compatible with alarm system.

- 1 B. Pressure Switches: Pressure actuated UL approved switch with field adjustable
2 settings, metal enclosure and electrical characteristics compatible with alarm
3 system.
- 4 C. Alarm Bell: 10" weatherproof electric alarm bell with red painted metal housing,
5 mounting base and gong; solenoid operator; weatherproofing ring seal and
6 electrical characteristics compatible with alarm system. Alarm bells shall be
7 located inside and outside of building.
- 8 D. Pressure gauges shall be as manufactured by Ametek/U.S. Gauge Division,
9 Ashcroft, Marsh, H.O. Trerice or equal. Select pressure range for twice the system
10 working pressure but not less than 200 psig. Include bronze pressure snubber and
11 ball valve gauge cock.
- 12 E. Automatic sprinkler systems shall be monitored by an approved supervising
13 station. The automatic fire sprinkler system shall be tied into the building fire
14 alarm control panel per NFPA 72, or a fire alarm panel shall be provided to
15 supervise and monitor the fire sprinkler system. The fire alarm panel shall be
16 protected in accordance with NFPA 72 and have at least one manual pull box for
17 testing purposes.

18 2.08 SPRINKLERS

- 19 A. Sprinklers shall be as manufactured by TYCO, Grinnell, Reliable, Viking or
20 Victaulic,
- 21 B. Fusible link or glass bulb, cast brass or bronze construction. Provide heads with
22 nominal 1/2" discharge orifice except where greater than normal density requires
23 large orifice.
- 24 C. Provide ordinary-temperature sprinklers except where maximum ceiling
25 temperatures exceed 100°F such as at skylights, sealed display windows,
26 unventilated attics and roof spaces, over cooking equipment, adjacent to diffusers,
27 unit heaters, uninsulated heating pipes or ducts, boiler rooms, or where otherwise
28 indicated. Where maximum ceiling temperatures exceed 100°F, provide sprinklers
29 with temperature ratings in accordance with NFPA 13 standards.
- 30 D. See drawings schedules sheet(s) for more information of specified sprinkler head
31 types, colors and finishes.

32 2.09 IDENTIFICATION

- 33 A. Valve Tags: Identify each valve in the system with valve tags in conformity with
34 the Fire Underwriters and State of Wisconsin requirements. Round brass tags with
35 1/2 inch numbers, 1/4 inch system identification abbreviation, 1 1/4 inch minimum
36 diameter with brass jack chains or brass "S" hooks around the valve stem,
37 available from EMED Co., Seton Name Plate Company or W.H. Brady.

- 1 B. Chart: Furnish three (3) charts, listing all valves, giving them locations in the
2 building and their function in the system. One (1) chart with glass cover and neat
3 frame; two (2) charts without frames to be delivered to the Architect.
- 4 C. All piping and equipment in this Division of the Work shall be identified as
5 required by NFPA Codes and local Fire Department Standards with not less than
6 1 inch high letters/numbers for marking pipe and equipment.
- 7 D. Engraved Name Plates: White letters on a black background, 1/16 inch thick
8 plastic laminate, beveled edges, screw mounting, Setonply Style 2060 by Seton
9 Name Plate Company or Emedolite Style EIP by EMED Co., on equal, by W.H.
10 Brady.

11 2.10 SPRINKLER HEAD FLEXIBLE CONNECTORS

- 12 A. Sprinkler head flexible connectors shall be equal to Victaulic series AQB braided
13 Aquaflex stainless steel sprinkler fitting with 1-BEE bracket for connection to
14 ceiling grid system. Minimum size shall be 1".

15 PART 3 EXECUTION

16 3.01 ERECTION

- 17 A. Install all piping parallel to building walls and ceilings and at heights which do
18 not obstruct any portion of a window, doorway, stairway, or passageway. Where
19 interferences develop in the field, offset or reroute piping as required to clear such
20 interferences. Coordinate locations of fire protection piping with piping,
21 ductwork, conduit and equipment of other trades to allow sufficient clearances. In
22 all cases, consult drawings for exact location of pipe spaces, ceiling heights,
23 ceiling grid layout, light fixtures, and grilles before installing piping.
- 24 B. Install piping so that system can be drained. Where possible, slope to main drain
25 valve. Slope dry pipe or pre-action systems subject to freezing at minimum
26 1/4"/10' on mains and 1/2"/10' on branches. Where piping is susceptible to freezing
27 and cannot be fully drained, install nipple and cap for drainage of less than 5
28 gallons or valve/nipple/cap for drainage over 5 gallons. Pipe drain valves to grade
29 or to air gap sewer receptor.

30 3.02 JOINTS AND CONNECTIONS

- 31 A. Threaded Pipe Joints: Use a thread lubricant or Teflon tape when making joints;
32 no hard setting pipe thread cement or caulking will be allowed.
- 33 B. Mechanical Grooved Pipe Connections: Use pipe factory grooved in accordance
34 with the coupling manufacturer's specifications or field grooved pipe in
35 accordance with the same specifications using specially designed tools available
36 for the application. Lubricate pipe and coupling gasket, align pipe, and secure
37 joint in accordance with the coupling manufacturer's applications.

- C. Copper Piping Joints: Remove all slivers and burrs remaining from the cutting operation by reaming and filing both pipe surfaces. Clean fitting and tube with metal brush, emery cloth or sandpaper. Remove residue from the cleaning operation, apply flux and assemble joint to socket stop. Apply flame to fitting until solder melts when placed at joint. Remove flame and feed solder into joint until full penetration of cup and ring of solder appears. Wipe excess solder and flux from joint.

3.03 HANGERS AND SUPPORTS

- A. Installation: Install supports to provide for free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

3.04 SPRINKLER HEADS

- A. Locate sprinkler heads as indicated on fire protection plan and reflected ceiling plan maintaining minimum clearances from obstructions, ceilings, and walls. Install sprinkler heads level in location not subject to spray pattern interference. Center sprinkler heads in ceiling panels.
- B. Sprinkler heads with concealed covers shall match the adjacent ceiling with color. Sprinkler heads with concealed covers shall have its color matched / painted by the manufacturer.

3.05 SWITCHES

- A. Locate flow and pressure switches where indicated and where required to obtain specified zoning to isolate floors and major areas of floors. Provide valved test connection for flow switch adjacent to flow switch. Pipe to floor drain. Test flow switch to verify proper operation.

3.06 GAUGES

- A. Provide a valved pressure gauge in main fire sprinkler zone riser.

3.07 VALVES

- A. Properly align piping before installation of valves. Do not support weight of piping system on valve ends. Mount valves in locations which allow access for operation, servicing, and replacement. Install all valves with the stem in the upright or horizontal position. Valves installed with the stems down will not be accepted. Provide a riser shutoff valve and a capped hose thread drain valve at the bottom of each riser. Provide capped hose thread drain valves to allow draining of each portion of piping.

3.08 IDENTIFICATION

- A. All equipment, pipe and valves, etc., shall be identified as listed below.
- B. All piping in this Division of the Work exposed, in access spaces or above ceilings shall be identified at minimum of 25' intervals and at least once in every room with W.H. Brady Co., Seton, or equal, pipe marking labels, 2¼" color as required by A.N.S.I. standards.
- C. Sprayed on pipe stencils letterings are not allowed.
- D. Valve tags shall be 1 1/8" round brass tags with black numerals. Fasten tags to body of valves with copper or brass chain. Numerals on tags shall correspond to the record drawings.
- E. Charts:
 - 1. Furnish three (3) charts listing all valves, giving their location in the building and describing the valve number, service, function, normal position, etc. One (1) chart encased in plastic to be mounted in the building maintenance office and the other two (2) charts delivered to the Architect for transmittal to the Owner.
 - 2. Furnish one (1) overall floor plan showing the location of all valves and the corresponding number from the valve chart.
 - 3. Provide hydraulic design information sign of permanently marked weatherproof metal or engraved nameplate material Secure to alarm valve with brass chain. Information to include location of the design areas, discharge densities, required flow and residual pressure at the base of riser, hose stream demand and sprinkler demand.

3.09 FIELD MEASUREMENTS

- A. Field verify all measurements. Do not base on contract drawings.
- B. Identify conflicts with the work of other trades prior to installation of work.
- C. Adjust system to satisfy field requirements.

3.10 DELIVERY, STORAGE AND HANDLING

- A. Receive, sign for and store all equipment in this section.
- B. Maintain original quality and condition of equipment while it is in storage.

3.11 INSTALLATION

- A. General:
 - 1. The complete installation shall be done in a neat, workmanlike manner in accordance with all applicable codes and the manufacturer's recommendations.

2. Install all materials, assemblies and equipment in strict accordance with manufacturer's recommendations and instructions. Consult manufacturer for all wiring diagrams, schematics, sizes, outlets, etc. before installing.

B. Piping System Leak Tests

1. Conduct pressure test with test medium of water. If leaks are found, repair the area with new materials and repeat the test; caulking will not be acceptable.
2. Test piping in sections or entire system as required by sequence of construction. Do not conceal pipe until it has been successfully tested. If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints. Entire test must be witnessed by the Division's representative.
3. Use clean water and remove air from the piping being tested where possible. Measure and record test pressure at the high point in the system.
4. Test system at 200 psi for 2 hours showing no leakage. Where system design is in excess of 150 psig, test at a pressure 50 psig above system design pressure.
5. All pressure tests are to be documented on NFPA Contractor's Material and Test Certificate forms.

C. Cutting And Patching

1. Patching includes repairing the openings remaining from the removal or relocation of existing system components and painting the surface to match existing. Painting means covering the entire surface where patching is to be done unless indicated to be done by other trades.
2. Do not pierce beams or columns without permission of the Architect/Engineer and then only as directed. If any piping is required through walls or floors where no sleeve has been provided, use a core drill to avoid all unnecessary damage and structural weakening.

D. Painting

1. Exposed fire protection piping is to be painted by Painting Contractor. Fire Protection Contractor shall protect sprinkler heads from painting in exposed areas.

E. Lubrication

1. Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is operated for any reason. Once the equipment has been run, maintain lubrication in accordance with the manufacturer's instructions until the work is accepted by the Owner. Maintain a log of all lubricants used and frequency of lubrication; include this information in the Operating and Maintenance Manuals at the completion of the project.

F. Electrical Coordination

1. All wire, conduit and other devices required for the control of fire alarm system shall be furnished by the Electrical Contractor.

2. Electrical Contractor will provide all power wiring and control wiring to all flow switches, tamper switches, alarms, detector valves, etc.
3. Furnish wiring diagrams to Electrical Contractor for all equipment and devices furnished by this Contractor and indicated to be wired by the Electrical Contractor
4. The Fire Protection Contractor shall furnish and install the tamper switches and flow switch. The Fire Protection Contractor shall furnish the interior and exterior alarm bells, the strobe lights, and alarm control panel to the Electrical Contractor, who shall install and wire these items.

G. Demolition

1. Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the Owner to minimize disruption to the existing building occupants.
2. All pipe, sprinklers, equipment, wiring, associated conduit and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All designated equipment is to be turned over to the Owner for his use at a place and time Owner so designates. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

H. Air Compressor

1. Provide rubber mounting for piping mounted air compressor.

3.12 OWNER TRAINING

- A. Instruct Owner's personnel in the proper operation, maintenance and testing of systems and equipment provided as part of this project.

3.13 SPARE EQUIPMENT

- A. Provide quantity of spare heads as noted below and 1 wrench for each type of head and each temperature range installed. Provide 6 spare heads per 300 or less installed heads, 12 per 1000 or less and 24 for more than 1000. Provide steel cabinet for storage of heads and wrenches.

END OF SECTION

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1 SECTION 22 01 00

2 PLUMBING REQUIREMENTS

3 PART 1 GENERAL

4 1.01 APPLICABLE PROVISIONS

5 A. Drawings and general provisions of contract, including general and supplemental
6 conditions and Division 01 specification sections, apply to work under this
7 Section.

8 B. This Section applies to all Division 22 sections of plumbing.

9 C. The Contractor performing the work of this Section applies to the plumber and or
10 pipe fitter licensed and certified per the State of Wisconsin requirements.

11 1.02 APPLICABLE PUBLICATIONS

12 A. Publications, standards and listing requirements called out in the Sections of this
13 Division of Labor shall form a part of these specifications as if contained herein.

14 B. The requirements of the Contract Documents, including the General Conditions,
15 and Supplementary Conditions, and Division 01 - General Requirements, apply to
16 this section except as modified herein.

17 1.03 DESCRIPTION OF WORK

18 A. Requirements of Instructions to Bidders, General and Project Requirements apply
19 to work under this Division, which shall include:

- 20 1. Section 22 01 00 – Plumbing Requirements
- 21 2. Section 22 05 02 – Plumbing Demolition
- 22 3. Section 22 05 05 – Through-Penetration Firestopping
- 23 4. Section 22 07 00 – Plumbing Insulation
- 24 5. Section 22 11 00 – Domestic Water Distribution System
- 25 6. Section 22 12 00 – Sanitary Drain, Waste and Vent System
- 26 7. Section 22 40 00 – Plumbing Fixtures

27 B. Work Included:

- 28 1. The work covered by this Division of the specifications includes the
29 furnishing of all labor, materials, tools, equipment, permits, certificates
30 and temporary connection necessary for or incidental to executing and
31 completing the plumbing work to make the system ready for normal and
32 proper operation, including all work or materials not directly shown on the
33 drawings or in the specifications, but necessary for the proper operation of
34 the system.

2. All work shall be as specified and indicated on the drawings unless specifically excepted on the drawings or herein and in compliance with the State of Wisconsin Uniform Building and Plumbing Code, Local Codes and Ordinances, Local Utility Regulations and OSHA.
3. All work shall be performed by individuals' license and certified per the State of Wisconsin requirements. Their work shall be performed to the satisfaction of the Architect / Engineer, and Owner.
4. Read all other Divisions of the Specifications which are applicable to this work, including the General Conditions section applicable to all bidders.
5. The Plumbing Requirements section is a supplement to and not a replacement for the project General Condition's section.
6. In cases of conflict with information in the General Conditions, the more stringent of the contract requirements shall be considered applicable.
7. Prior to submitting bid, call to the attention of the Plumbing Engineer any material or apparatus believed to be inadequate or any necessary items or work omitted.
8. Address any questions regarding the interpretation of the plans and/or specifications at least 12 days before the bid opening.
9. The Plumbing Engineer reserves the right to interpret his own specifications and plans after bids are received, and to demand that the installation conform to his intent.
10. Failure to become acquainted with existing conditions at the site shall in no way relieve the responsibility for making installation in conformance with plans and specifications without additional cost to the owner.

C. Examination of Plans, Specifications and Site:

1. Before submitting a bid, the bidder shall familiarize himself with all features of the building and site which may affect the execution of his work.
2. No extra payment will be allowed for the failure to obtain this information.
3. If there are omissions or errors in the plans or specifications, they shall be clarified with the architect prior to submitting bid.
4. For all remodeling projects, a site visit to the premises, for the purpose of the noting of all existing conditions which may affect work is required.
5. Knowledge of all existing conditions, which may affect work in a renovation project, shall be included in the preparation of bid.
6. Lack of information on existing conditions shall not be allowed for a valid cause for additional compensation.

D. Codes, Permits, and Inspection Fees

1. All work and materials shall conform in every respect to the current rules and requirements of the State of Wisconsin Uniform Building and Plumbing Code, Local Codes and Ordinances, Local Utility Regulations and OSHA.

2. Give to the proper authorities all required notices relating to the project, obtain all official permits and licenses required, pay all fees incidental thereto, deliver upon completion of the work and without cost to the Owner all required certificates of inspection and approval.
3. Secure all local permits, utility fees and licenses applicable for the work under this Division and pay all fees, including posting all bonds incidental thereto. Plan review submittal to the State of Wisconsin Department of Safety and Professional Services or its designated municipality, shall be by the Architect and Engineer.

1.04 RELATED WORK ELSEWHERE

- A. Thoroughly inspect entire set of plans and specifications as to the class of building construction in general and specifically to the items of other divisions that affect the work of this Division.
- B. Work of this Division also includes any plumbing work shown on the drawings and included in the specifications of other Divisions.
- C. Drawings and specifications of the work under this Division are intended for a complete project. If trade jurisdiction requires portions of the work be done by other tradesmen, this Division's contractor shall sublet those portions of the work to qualified contractors, however this Division's contractor shall be held fully responsible for all such installations.

1.05 SHOP DRAWINGS

- A. Submit shop drawings for all equipment and systems as indicated in the specification. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents.
- B. Submit electronic files with dimensions, capacities, and information as soon as available from the list of acceptable manufacturers.
- C. Shop drawings shall include, but are not limited to, the following items:
 1. Plumbing Fixtures and Trim.
 2. Drains and Cleanouts.
 3. Pipe, Fittings, and Valves.
 4. Bedding and Backfill Material.
 5. Pipe Insulation, and Pipe Hangers / Support.
 6. Pipe Labels, and Valve Tags.
- D. The Architect, Engineer or its representative shall review and comments on all items being submitted and items to be installed. The Architect, Engineer or its representative holds the right to request submitted items to be revised and resubmitted or to reject a submitted item if it does not meet the conformity with the design concept of the work as established in the Contract Documents.

- 1 E. All shop drawings, product data, and samples submittals shall illustrate details of
2 the work, fixtures, equipment, materials, products, systems, designs or
3 workmanship that this Division's contractor intends to use in order to comply
4 with the design concept established in the Contract Documents. Review of these
5 submittals by the Architect, Engineer or its representative is only for the limited
6 purpose of checking for conformity with the design concept of the work as
7 established in the Contract Documents, and is not intended to be for the purpose
8 of determining the accuracy of other matters that may be contained in such
9 submittals, including, but not limited to such matters as dimensions, quantities,
10 performance of fixtures, equipment and systems design and installed, engineering
11 and design, construction means, methods, techniques, sequences, procedures or
12 safety precautions, the correctness of which as set forth in the Contract
13 Documents or submittal shall be the sole responsibility of by this Division's
14 contractor.
- 15 F. Any flagged deviations on the shop drawings from the specified item and any
16 approval of the shop drawings will not be considered acceptance of the deviation
17 unless it's been explicitly flagged.
- 18 G. Where any specific fixture, equipment, materials, process or method of
19 construction is specified by name or by reference to the model number of a
20 manufacturer, the specifications are to be used as a guide and are not intended to
21 take precedence over the basic duty and performance specified or noted on the
22 drawings.

23 1.06 OPERATION & MAINTENANCE MANUALS

- 24 A. Submit operation and maintenance manuals following Section specific shop
25 drawing submittal guidelines.
- 26 1. Upon the complete installation of the work under this Division, this
27 Division's contractor shall provide the necessary qualified personnel for
28 operating the systems as directed by and scheduled with the Architect,
29 Engineer and the Owner. At this time, this Division's contractor shall
30 instruct the Owner or his representative in the operation, adjustment and
31 maintenance of all equipment furnished.
- 32 2. Provide (1) electronic and three (3) paper copies of maintenance manuals
33 shall be submitted, which shall present full details for the care,
34 maintenance, and operation of all equipment and systems.
- 35 3. Provide documentation in the operation and maintenance manual to
36 required testing of the work under this Division.
- 37 B. Record Drawings:
- 38 1. Record drawings shall be kept daily, noting all changes and available upon
39 demand.
- 40 2. Record drawings shall reflect any changes or pipe re-routing due to
41 construction phasing or existing field conditions.

- 1 3. Final record drawings shall be provided to Architect / Engineer and owner
2 at the completion of the project. Final record drawing shall be submitted in
3 electronic PDF form (not handwritten mark-ups) or recorded in CAD /
4 BIM format with the ability to extract an electric PDF.

5 1.07 QUALITY ASSURANCE

- 6 A. All products and materials used are to be new, undamaged, clean and in good
7 condition. Existing products and materials are not to be reused unless specifically
8 indicated.
- 9 B. Where equipment or accessories are used which differ in arrangement,
10 configuration, dimensions, ratings or engineering parameters from those indicated
11 on the contract documents, the Contractor is responsible for all costs involved in
12 integrating the equipment or accessories into the system and for obtaining the
13 intended performance from the system into which these items are placed.
- 14 C. Provide all necessary accessories required for a complete and operable system.

15 1.08 WARRANTY

- 16 A. The Work of this Division shall be guaranteed, in writing, to be free from defects
17 in materials and/or workmanship for one (1) year from the date of certificate of
18 completion and acceptance of the work. Necessary instruction and/or emergency
19 services to be performed as a result of defects in materials or workmanship shall
20 be furnished for one (1) year at no extra cost for labor or materials. If default
21 thereof, the Owner may have such work done and charge all applicable costs to
22 the Contractor.
- 23 B. Furnish manufacturer's written warranties on all equipment to the Owner stating
24 effective date of warranty.
- 25 C. The warranty shall be comprehensive. No deductibles shall be allowed for travel
26 time, service hours, repair parts cost, etc.

27 PART 2 PRODUCTS

28 2.01 GENERAL

- 29 A. It is the intent of these specifications that all the necessary material, apparatus,
30 and devices to complete the installation as specified herein, except such parts as
31 are specifically accepted, shall be provided.
- 32 B. If an item is either shown on the drawings or called for in these specifications,
33 shall be considered sufficient as an item part of this contract.
- 34 C. All materials, products, fixtures and equipment shall be an approved product per
35 the State of Wisconsin Department of Safety and Professional Services.

- D. All sizes given are as minimum.
- E. Material and labor shall be first class and workmanlike and to the satisfaction of the Plumbing Engineer and shall be subject to inspection test and approval at all times from commencement until acceptance of completed work.
- F. Manufacturers shall be responsible for providing material listed by U.L. or other approved agencies, and all governing codes and ordinances.
- G. All material must bear U.L. and/or other approved labels where possible.
- H. Items specified by catalog number or brand name and approval of shop drawings will not relieve the manufacturer of this responsibility.

2.02 TEMPORARY UTILITIES AND TOILETS

A. Water:

1. Temporary water shall be provided by this Division's contractor.
2. Temporary water piping shall be provided with protection from freezing
3. Provide two (3) ¾" hose bibbs with backflow protection located where directed for use by all Contractors.
4. This Division's contractor shall maintain valves and connections in perfect condition at all times. Each trade contractor shall provide their own hose or piping from hose bibbs provided by this Division's contractor.
5. Each trade contractor shall be mindful as to prevent the waste of water used for their work.
6. The Owner will pay cost of cold water used only. Contractors requiring hot water for construction must make the required provisions.

B. Toilet:

1. The General Contractor shall provide approved and adequate temporary toilet facilities for all trades.

C. Pumps:

1. Temporary pumps required for pumping water from building and excavations shall be provided by the contractor providing the work.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify fixtures and equipment are in compliance with approved submittal drawings.

3.02 FIELD MEASUREMENTS

- A. Field verify all measurements. Do not base on drawings.

1 B. Identify conflicts with the work of other trades prior to installation of work.

2 C. Adjust system to satisfy field requirements.

3 3.03 DELIVERY, STORAGE AND HANDLING

4 A. Receive, sign for and store all equipment in this section.

5 B. Maintain original quality and condition of equipment while it is in storage.

6 3.04 INSTALLATION

7 A. General:

- 8 1. The complete installation of the work under this Division shall be done in
9 a neat, workmanlike manner in accordance with all applicable codes and
10 the manufacturer's recommendations.
- 11 2. Install all materials, assemblies, fixtures and equipment in per the
12 manufacturer's recommendations and requirements. Consult
13 manufacturer as required for missing information and technical advice of
14 that product.

15 B. Diagrams, Measurements, Final Layout Drawings:

- 16 1. Drawings show the layout in general and approximate locations of piping,
17 major equipment, etc., and shall be followed as closely as the actual
18 construction of the building, work of other trades, and the locations of
19 equipment will permit.
- 20 2. All changes from the drawings necessary to make the work under this
21 Division conform to the building as constructed and to fit the work of
22 other trades shall be made without extra cost.
- 23 3. Drawings for the work under this Division shall not be scaled for exact
24 dimensions. Consult the architectural and structural drawings and details
25 for all dimensions and location of the work under this Division.

26 C. Protection of Finished Work and Materials:

- 27 1. Protect all materials and work performed under this Division from damage
28 or injury that may be caused by other workmen and from the action of the
29 elements.
- 30 2. Protect the materials and work performed by other Divisions, and the
31 Owner's property from damage or injury arising from work under this
32 Division.
- 33 3. Keep all piping and equipment capped, plugged, drained, or otherwise
34 protected including protection from freezing and by stoppage from
35 building materials, sand or dirt, mortar, concrete, etc.

36 D. Cleaning and Finishing:

1. After all work under this Division have been made and the system pronounced as satisfactory, this Division's contractor shall go over all his work and clean equipment, fixtures, piping, etc. and leave clean and in complete working order at final completion of the building.
2. The putting of new work, or any part thereof, into use, even though with the Owner's consent, shall not be construed to be an acceptance of the work on the part of the Owner, nor shall it be construed to obligate him, in any way, to accept improper work or defective material.

E. Cooperation with Other Divisions and the Owner:

1. Give full cooperation to other trades and furnish any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference or delay.
2. The Work of this Division must be coordinated with the work of other Divisions and the Owner to prevent interference. Any necessary changes to be made because of the lack of proper coordination shall be performed without extra charge.
3. Where the work of this Division will be installed in close proximity to the work of other trades, or where there is evidence that the work of the Contractor will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment.
4. If the Contractor installs his work before coordinating it with other trades, he shall make necessary changes in his work to correct the condition without extra charge.
5. Provide all service connections under the jurisdiction of the work under this Division to Owner's equipment or equipment furnished by other Divisions as required for a complete and operating installation.

F. Supervision:

1. Provide the services of an experienced superintendent who shall be constantly in charge of all the work included in or related to this Division.

G. Substitutions:

1. All costs, as a result of submitted substituted items by the Contractor and with the approval by the Architect or Engineer, including costs required under other Contracts, shall be the responsibility of the Contractor requesting the substitution. None of the extra costs resulting from such approval shall evolve upon the Owner, the Architect, other Consultants, or other Contractors.

3.05 OWNER TRAINING

- A. Provide as outlined in each specification section requiring owner training.

3.06 SPARE EQUIPMENT (NONE)

END OF SECTION

SECTION 22 05 02

PLUMBING DEMOLITION

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

- A. Drawings and general provisions of contract, including general and supplemental conditions and Division 01 specification sections, apply to work of this section.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify field measurements as shown on Drawings.
- B. Beginning of demolition means this Division's contractor accepts existing conditions.

3.02 PREPARATION

- A. Disconnect existing piping systems that are underground, in walls, in floors, and above ceilings that are scheduled for removal.
- B. Coordinate with local utility as required to complete work.
- C. Provide temporary piping and connections to maintain existing systems in service during construction. When work must be performed on active mains, use personnel experienced in such operations.
- D. Existing Plumbing Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from Owner at least 24 hours before partially or completely disabling system. Minimize shutdown duration. Make temporary connections to maintain service in areas adjacent to work area.

3.03 CONNECTIONS TO EXISTING PLUMBING

- A. There are various references made on the plumbing drawings which indicate connections to existing fixtures, equipment and piping systems. Visit the project site prior to assembling bid to investigate how to make connections to existing fixtures, equipment and piping system. In many cases the drawings do not specifically delineate how these connections are to be made.
- B. Connections to existing piping shall be thoroughly investigated by this Division's contractor.
- C. Camera existing piping systems to ensure proper system identifications, flow and operation prior to connection.

3.04 DEMOLITION AND EXTENSION OF EXISTING PLUMBING

- A. Work with the general contractor and all other contractors to provide all plumbing work as required to disconnect all plumbing connections in the demolished area.
- B. Remove, relocate, and extend existing installations to accommodate new construction.
- C. For all removed plumbing equipment, assume responsibility for removing the piping back to the nearest active water main or drain.
- D. Assume that any existing piping that are interrupted by the remodeling that require continued service shall be reconnected and routed around the remodeled area.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.
- F. Repair and replace existing pipe valve as required to complete work.
- G. Maintain access to existing plumbing installations which remain active. Modify installation as required.
- H. Extend existing installations using materials and methods compatible with existing electrical installations, or as specified.
- I. Check with Owner to determine if the Owner wants to retain the removed equipment. If so, move it to the Owner's storage, assumed not to be in the same building, but within 5 miles of site. If not, remove material and dispose of properly at own expense.

3.05 EXISTING FLOOR, WALLS CEILING WITH NEW WALL FINISHES

- 1 A. On existing surfaces that are covered with new finishes, remove the existing
2 fixture trim, install extension piping as required per new wall surface and reinstall
3 a new fixture trim.

4 3.06 REMOVAL OF FIXTURES AND EQUIPMENT

- 5 A. For the removal of all fixtures and equipment, provide for proper disposal and or
6 recycling.

7 3.07 EXISTING IN-GROUND UTILITIES

- 8 A. Mark all in-ground utilities in areas of excavation. Determine, with other
9 contractors, where excavations will take place, and work with the Owner and
10 existing drawings to mark existing in-ground utilities. Instruct all other trades as
11 to the location and depth of the utilities. This shall include:

- 12 1. Domestic Water piping.
- 13 2. Sanitary Drain Waste and Vent Piping.

14 3.08 WORK IN EXISTING CORRIDORS AND ROOM SPACES

- 15 A. Review the HVAC drawings and in those corridors and room spaces where
16 ductwork or other piping is being routed through the existing corridor or room
17 space, assume to coordinate the ductwork installation with the HVAC contractor
18 so that it does not interfere with existing piping in the ceiling. In bid, assume
19 relocation of the existing piping that will be located above the new ductwork.
20 Pipe valves shall be moved to one side or the other so as not to be blocked by the
21 ductwork.

22 3.09 RECONNECTION TO EXISTING PIPING, FIIXTURES AND EQUIPMENT

- 23 A. Where it is indicated on the drawings as 'connect to existing' assume that the note
24 references reusing the existing piping, fixtures and equipment. Make
25 determination if existing pipes are in a condition for that connection. Extend the
26 new piping from the new equipment back to the point where pipes, tees / fittings
27 or valves are available. Coordinate with the demolition contractor to maintain
28 piping that the plumbing contractor may require to remain in place for reuse.
29 Provide new piping, tees / fittings and valves as required.

30 3.10 CLEANING AND REPAIR

- 31 A. Clean and repair existing materials and equipment which remain or are to be
32 reused.

33 3.11 SERVICE REVISIONS

- 1 A. Coordinate plumbing service installation with building construction. Include in
2 bid temporary costs associated with keeping the existing plumbing service
3 operating until the new service is installed.
- 4 B. Visit the site prior to bid to determine the best pipe routing, from the existing
5 services, to the new service locations. Piping shall be route to allow for it to be
6 concealed where in finished areas. This routing may be above ceilings, in
7 building tunnels [or at the building exterior]. For exterior construction, mark all
8 existing in ground utilities, trenching, backfilling, and site restoration back to
9 original condition. Refer to other portion of this specification regarding the
10 installation of underground and exposed exterior piping.
- 11 C. Work with the Owner to install the new plumbing service within the Owner's use
12 of the building. Assume that all water shut-offs shall be done on an overtime
13 basis and shall include the same in bid. Work with the Owner to determine if shut
14 down can be accomplished on a day when the facility does not require water.
15 Determine the best way to install the new service so as to provide a minimum of
16 downtime.
- 17 D. All existing service meters and equipment that is no longer required shall be
18 removed in its entirety. Any openings left in the floors, walls or ceiling shall be
19 patched back to the same type of wall surface as the existing. For ceiling
20 penetrations provide insulation to match existing and hire approved roofing
21 contractor to patch openings.
- 22 E. Ascertain the best connection method for back feeding existing water main and
23 make necessary modifications to existing piping to make that connection.

24 3.12 PIPING, FIXTURE AND EQUIPMENT REMOVAL

- 25 A. Where existing fixtures, equipment and piping are being noted for demolition as
26 part of the plumbing construction, this Division's contractor shall assume the
27 following:
28 1. Existing water supply shut-off valves are accessible and operable.
- 29 B. Where existing fixtures, equipment and piping are being noted for demolition as
30 part of the plumbing construction, this Division's contractor shall do the
31 following:
32 1. Disconnect, remove and dispose of existing fixtures and or equipment,
33 along with related water and waste supply piping (fixture trim).
34 2. Disconnect, remove and dispose of existing water piping designated for
35 demolition back to active mains and cap with brass or similar material as
36 required. Provide an approved seal method per State of Wisconsin
37 Uniform Plumbing Code.

3. Disconnect, remove and dispose of existing conductor, drain, waste and vent piping designated for demolition back to mains stacks / piping. Provide an approved seal method per State of Wisconsin Uniform Plumbing Code.
4. Disconnect, remove and dispose of abandoned existing conductor, drain, waste, vent, water and gas piping above existing ceilings from the site. Disposal cost and fees shall be covered by this Division's contractor.
5. Plug / cap existing plumbing piping below / behind / above surface of new finished floor / wall / ceiling. All caps/plugs required to seal existing plumbing system shall match the existing system's material or be brass or copper.
6. Using cement mortar to seal abandoned floor drains will not be permitted.
7. Any other materials necessary for demolition shall comply with this Division's Sections.

3.13 REMOVAL NOTES ON DRAWINGS

- A. The demolition notes on the drawings are meant to aid the contractor of general work to be done in that area.

3.14 INSTALLATION

- A. Re-install relocated materials and equipment as noted on drawings.

END OF SECTION

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SECTION 22 05 05

THROUGH-PENETRATION FIRESTOPPING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. Contractor (EC, MC, PC or FPC) shall reference specification Division 07 for all firestopping materials and requirements.
- B. All penetrations through fire and/or smoke rated walls required by this contractor shall be done by utilizing sleeves or openings dedicated to the contractor's systems. This contractor shall coordinate with the Firestopping Contractor to ensure that the sleeve, conduit, or opening fill is not exceeded for the planned firestopping system. Do not share sleeves, openings, or penetrations that require firestopping with other trades.
- C. All firestop materials shall be furnished and installed by a dedicated Firestopping Contractor, costs for which shall not be born by this contractor.
- D. The intent is that this contractor shall identify and coordinate all penetrations through fire barriers with the Firestopping Contract.
- E. The contractor (EC, MC, PC or FPC) shall indicate what type of material, system, or product will penetrate each fire/smoke rated assembly to ensure that there is a UL Listed firestop assembly that will restore the listed fire/smoke rating to the element being penetrated.

END OF SECTION

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SECTION 22 07 00

PLUMBING INSULATION

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

- A. Drawings and general provisions of contract, including general and supplemental conditions and Division 01 specification, apply to work under this Section.

1.02 DESCRIPTION OF WORK

- A. Furnish and install a complete and operable insulation system as indicated on the drawings and as specified herein.

- B. Provide and install insulation for the following:

1. Sanitary – PVC drain, waste and vent piping installed in a plenum ceiling.
2. Domestic – All water piping installed above floor and below ground.

- C. Quality Assurance:

1. All work shall be performed by skilled tradesmen, pipe insulator, regularly engaged in this work.
2. All spaces, equipment, piping, ductwork, etc., shall be protected from dropping of insulation materials. Leave all areas in a clean and orderly condition.
3. Insulation to have flame rating of 25 or less and shall not melt or drip when exposed to flame.
4. Insulation in active supply and return air plenums to have a smoke developed rating of 50 or less.

1.03 SHOP DRAWINGS

- A. Submit electronic files of drawings with dimensions, capacities, and information as soon as available from manufacturers.

1.04 QUALITY ASSURANCE

- A. All materials, equipment, and parts shall be new and unused of current manufacture.

- B. Provide all necessary accessories required for a complete and operable system.

1.05 WARRANTY

- A. Materials and workmanship shall be warranted for a period of not less than 1 year from the date of commissioning against defects in material and workmanship.

- 1 B. The warranty shall be comprehensive. No deductibles shall be allowed for travel
2 time, service hours, repair parts cost, etc.
- 3 C. The warranty shall not deprive the Owner of other rights the Owner may have
4 under other provisions of the Contract Documents and will be in addition to and
5 run concurrent with other warranties made by the Contractor under the
6 requirements of the Contract Documents.

7 PART 2 PRODUCTS

8 2.01 GENERAL

- 9 A. All products furnished shall be current production of manufacturers regularly
10 engaged in the manufacture of such items, and for which replacement parts are
11 available. All materials and equipment shall be new (less than 1 year old when
12 turned over to the Owner).

13 2.02 PRODUCTS

14 A. General:

- 15 1. See contract drawings and details sheet(s) for more information.
16 2. Insulation systems (insulation, jackets, sealants, mastics, and adhesives)
17 that are installed in plenum ceiling shall have a flame spread rating of 25
18 or less and smoke developed rating of 50 or less and shall meet UL-
19 723/ASTM E84 requirements.

20 B. Manufactures:

- 21 1. Pipes, fitting and valves insulation material acceptable manufactures shall
22 be Armstrong, CertainTeed, Manville, Knauf, Owens-Corning, or an equal
23 approved by the engineer.

24 C. Applications and Thickness:

- 25 1. Insulate all above ground cold water hard and soft pipes, fitting and valves
26 with ½" thick rigid fiberglass insulation with ASJ/SSL jacket and maintain
27 a continuous vapor barrier.
28 2. Insulate all above ground hot water supply and return pipes, fitting and
29 valves with 1" thick rigid fiberglass insulation with ASJ/SSL jacket and
30 maintain a continuous vapor barrier.
31 3. Insulation material jointing method / adhesive shall be an approved
32 method by the pipe insulation manufacturer.

33 D. PVC Jackets:

- 34 1. N/A.

35 PART 3 EXECUTION

36 3.01 EXAMINATION

1 A. See contract drawings for more information.

2 3.02 FIELD MEASUREMENTS

3 A. Field verify all measurements. Do not base on contract drawings.

4 B. Identify conflicts with the work of other trades prior to installation of work.

5 C. Adjust system to satisfy field requirements.

6 3.03 DELIVERY, STORAGE AND HANDLING

7 A. Receive, sign for and store all equipment in this section.

8 B. Maintain original quality and condition of equipment while it is in storage.

9 3.04 INSTALLATION

10 A. General:

11 1. Install all products per manufacturer's specifications and
12 recommendations.

13 2. See contract drawings and detail sheet(s) for more information.

14 3. Do not install any insulation to any piping until it has been tested and past
15 inspection by AHJ and or Architect / Engineer.

16 B. Repair insulation on existing piping which is damage due to connecting new
17 piping systems. The existing vapor barrier integrity shall be maintained.

18 C. Install insulation continuous without interpretation through walls and floor
19 penetrations and hangers.

20 D. Install insulation system on all pipes, fitting and valves as specified above.
21 Maintain the thickness on all areas as specified above.

22 E. All joints shall be tight with insulation lengths tightly butted against each other.

23 F. All cuts shall be smooth and square and without breakage of end surfaces.

24 G. Adhesive shall be non-flammable solvent base, synthetic rubber type.

25 H. Adhesive shall be used on water piping systems. Outward clinch staples may be
26 used.

27 3.05 OWNER TRAINING (NONE)

28 3.06 SPARE EQUIPMENT (NONE)

29 END OF SECTION

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SECTION 22 11 00

DOMESTIC WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

- A. Drawings and general provisions of contract, including general and supplemental conditions and Division 01 specification sections, apply to work under this Section.

1.02 DESCRIPTION OF WORK

- A. Furnish and install a complete and operable system as indicated on the drawings and as specified herein.
- B. Materials:
1. Materials shall conform to the standard prescribed in the Wisconsin Uniform Plumbing Code and be approved for use by the Department of Safety and Professional Services, Division of Technical Services. When required, Plumbing Contractor shall obtain approval prior to installation.
 2. All materials and equipment required for the work shall be new, of first-class quality and shall be furnished, delivered, erected, connected and finished in every detail and shall be so selected and arranged as to fit into the building spaces.

- C. Materials Not Included:
1. Items furnished by other Sections.

1.03 SHOP DRAWINGS

- A. Submit electronic files with dimensions, capacities, and information as soon as available from manufacturers.

1.04 QUALITY ASSURANCE

- A. All materials, equipment, and parts shall be new and unused of current manufacture.
- B. Provide all necessary accessories required for a complete and operable system.

1.05 WARRANTY

- A. Materials and workmanship shall be warranted for a period of not less than (1) year from the date of commissioning against defects in material and workmanship.

- 1 B. The warranty shall be comprehensive. No deductibles shall be allowed for travel
2 time, service hours, repair parts cost, etc.
- 3 C. The warranty shall not deprive the Owner of other rights the Owner may have
4 under other provisions of the Contract Documents and will be in addition to and
5 run concurrent with other warranties made by the Contractor under the
6 requirements of the Contract Documents.

7 PART 2 PRODUCTS

8 2.01 GENERAL

- 9 A. All materials and equipment furnished shall be current production of
10 manufacturers regularly engaged in the manufacture of such items, and for which
11 replacement parts are available. All materials shall be new (less than 1 year old
12 when turned over to the Owner).

13 2.02 MANUFACTURERS

- 14 A. Category types shall be of the same manufacturer.
- 15 B. No private label wholesale products will be accepted.

16 2.03 WATER DISTRIBUTION SYSTEM PIPING

- 17 A. Above ground pipes and fittings within the building shall be as follows:
18 1. Type "L" hard copper. ASTM B42, ASTM B88 standards.

19 2.04 JOINTS FOR WATER DISTRIBUTION SYSTEM PIPING

- 20 A. Copper pipe joints shall be as follows:
- 21 1. Wrought copper sweat fittings. Joints shall have 95-5 solder and made
22 with lead free paste flux mechanically cleaned before soldering. ASTM
23 B32 standards.
- 24 2. Mechanical grooved fittings and couplings or rolled grooved pipe 2 1/2" or
25 larger may be used in lieu of soldered fittings. Mechanically formed
26 brazed tee connections on piping 2 1/2" and larger may be used in lieu of
27 specified tee fittings for branch take-offs up to one-half the diameter of the
28 main.
- 29 3. Mechanical press fittings and couplings may be used in lieu of soldered
30 fittings.

31 2.05 VALVES

- 1 A. Provide all valves of figures, types and number throughout the entire plumbing
2 installation as specified. Valves of reputable manufacturers such as Nibco,
3 Milwaukee, Hammond, Watts, Apollo, or equal will be acceptable. The
4 manufacturer's name and valve number shall be cast into the body of the valve.
5 All potable valves shall meet the Wisconsin Lead Free Act for 2014.
- 6 B. In general, all valves shall be of standard dimensions and suitable for a minimum
7 150 lbs. working pressure. Provide ball valves for piping 2 and smaller and gate
8 or butterfly valves for piping 2 ½" and larger.
- 9 C. Ball valves shall be full port similar to Nibco S or T -FP-600A-LF. Ball valves
10 shall have extended tee handle to prevent any interference with the pipe insulation
11 similar to Nibco CS Extended Lever Handle.
- 12 D. Check valves shall be similar to Nibco S or T -480-Y-LF for piping 2" and
13 smaller and Nibco #W-910 for piping larger than 2".
- 14 E. Balancing valves, calibrated type, circuit setters equal to Bell & Gossett CB Lead
15 Free Circuit Setter Plus Calibrated Balance valves. Provide ball valve per this
16 section for isolation of branch piping.
- 17 F. Boiler drain valves shall be similar to Nibco #74-CL.

18 2.06 THERMOMETERS & PRESSURE GAUGES

- 19 A. Thermometers shall be similar to Terice vapor actuated dial thermometers with 4
20 ½" dial and 40° to 240°F range.
- 21 B. Pressure gauges shall be similar to Terice vapor actuated dial pressure gauge
22 with 4 ½" dial and 0 to 180psig range.
- 23 C. Thermometers and gauges manufacturers shall be Terice or Marsh.

24 2.07 UNIONS AND FLANGES

- 25 A. Provide unions or flanges for all backflow preventers, check valves, water heater
26 connections, or wherever is required for proper piping and equipment installation.
27 Provide insulating dielectric type unions or flanges with isolation kits between
28 pipe of dissimilar metals.

29 2.08 HANGERS, ANCHORS AND INSERTS

- 30 A. See plumbing drawing's Pipe Hangers, Supports and Insulation Detail.
- 31 B. All piping in the plumbing system shall be supported with hangers in accordance
32 with the provisions of the Wisconsin Uniform Plumbing Code.
- 33 C. The use of perforated strap hangers will not be acceptable.

- D. Use approved malleable, wrought iron or steel pipe riser clamps for steel or cast iron pipes and copper plated clamps for copper pipes.
- E. Provide all necessary inserts for supporting piping and equipment.
- F. Piping shall be supported with clevis or adjustable band loop hangers at intervals recommended by the manufacturer.
- G. Provide low compressive insulation protectors on all insulated piping supported by hangers or strut channel. Protective shield material shall be galvanized carbon steel with pre-insulated calcium silicate support blocks.
- H. Manufacturers shall by B-Line, Anvil, Fee & Mason, Elcen or an equal approved by the engineer.

2.09 SUPPORTS

- A. See plumbing drawing's Pipe Hangers, Supports and Insulation Detail.
- B. Provide all structural supports required for equipment included under this Division of the Work.
- C. Structural supports that is required for the installation of the system specified shall be done and repaired by this Division's contractor in coordination with the general contractor and under the direction and to the satisfaction of the Architect and Engineer.

2.10 WATER HAMMER ARRESTERS

- A. Water Hammer Arresters shall conform to ASME, ASSE standards and approved by the State of Wisconsin per outlet application.
- B. Water Hammer Arresters shall be have isolating valves, quick-closing valves and installed at locations in the piping system as required to accomplish noiseless operation of the system under all operating conditions.
- C. Water Hammer Arresters shall be exposed or accessible by means of access panels.
- D. Size and locate water hammer arrestors outlet application per the manufacture recommendation.
- E. Manufacturers shall by Precision Plumbing Products, Sioux Chief, Watts, Zurn.

2.11 ESCUTCHEONS

- A. See plumbing drawing's Pipe Penetration Detail.

1 B. Provide on all pipes passing through finished floors, walls and ceilings with
2 outside diameter sufficient to cover sleeve opening and inside diameter to fit
3 snugly around pipe.

4 C. Escutcheon plates shall be chrome plated brass.

5 D. Manufacturers shall by BrassCraft, Dearborn, Keeney, McGuire.

6 2.12 ACCESS PANELS

7 A. Provide access panels shall have with key locking device and sized as required for
8 access to all cleanouts, valves, traps, thermostatic mixing valves, water hammer
9 arresters, etc.

10 B. Panels shall be installed by Plumbing Contractor in openings provided by the
11 General Contractor as located and supervised by this Division.

12 C. Manufacturers shall by KARP and Associates, Milcor, or Titus.

13 2.13 VALVE AND PIPE IDENTIFICATION

14 A. All equipment, pipe and valves, etc., shall be identified as listed below.

15 B. All piping in this Division of the Work exposed, in access spaces or above
16 ceilings shall be identified at minimum of 25' intervals and at least once in every
17 room with W.H. Brady Co., Seton, or equal, pipe marking labels, 2¼" color as
18 required by A.N.S.I. standards.

19 C. Sprayed on pipe stencils letterings are not allowed.

20 D. Valve tags shall be 1 1/8" round brass tags with black numerals. Fasten tags to
21 body of valves with copper or brass chain. Numerals on tags shall correspond to
22 the record drawings.

23 E. Equipment and starters shall be identified with neat, clear, permanent labels.

24 F. Charts:

- 25 1. Furnish three (3) charts listing all valves, giving their location in the
26 building and describing the valve number, service, function, normal
27 position, etc. One (1) chart encased in plastic to be mounted in the
28 building maintenance office and the other two (2) charts delivered to the
29 Architect for transmittal to the Owner.
30 2. Furnish one (1) overall floor plan showing the location of all water
31 distribution valves and the corresponding number from the valve chart.

32 2.14 PIPE SLEEVES

33 A. See plumbing drawing's Pipe Penetration Detail.

- B. Provide sleeves for pipes passing through masonry or concrete walls and floors, seal all openings between pipe and sleeve with vinyl acrylic plastic. For piping passing through fire walls, floors or ceilings, use 3-M Fire Barrier CP-25 caulk and 303 putty synthetic elastomers, U.L. rated.
- C. Sleeves for pipes passing through floors outside of chases shall be constructed of schedule 40 galvanized steel pipe 1/2" larger than pipe or pipe covering and shall extend 1/2" above finished floors.
- D. Provide 20 gauge galvanized iron sleeves 1" larger than the outside diameter of pipe or insulation and of sufficient length to pass through walls, partitions, etc., for piping exposed to view.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Field verify that all equipment and fixtures are in compliance with approved submittal drawings.

3.02 FIELD MEASUREMENTS

- A. Field verify all measurements. Do not base on contract drawings.
- B. Identify conflicts with the work of other trades prior to installation of work.
- C. Adjust system to satisfy field requirements.

3.03 DELIVERY, STORAGE AND HANDLING

- A. Receive, sign for and store all equipment in this section.
- B. Maintain original quality and condition of equipment while it is in storage.

3.04 INSTALLATION

- A. Cutting and Patching
 - 1. All existing concrete floor / wall cutting and material removal that is required for the installation of the system specified shall be done and repaired by this Division's contractor in coordination with the general contractor and under the direction and to the satisfaction of the Architect and Engineer. No cutting of structural work shall be done without the written consent of the Architect and Engineer, and all such work shall be done in accordance with their directions and supervision.
 - 2. Holes cut through precast concrete floors / walls shall be rotary or core drilled per the manufacturer's recommendations.

3. All concrete floor / wall patching and refinishing that is required for the installation of the system specified shall be done by this Division's contractor in coordination with the general contractor and under the direction and to the satisfaction of the Architect and Engineer.
4. Replacement of all existing areas removed to install piping by this Division's contractor must be replaced to match existing surrounding surface.

B. Installation

1. All installation as be installed per the local and state of Wisconsin Unformed Plumbing code.
2. Verify existing and proposed pipe connection elevations and locations in the field and notify the Architect and Engineer, in writing, of any variances prior to the start of any work.
3. Provide new isolation ball valves and balancing valves when connecting to existing piping.
4. Underground piping shall be laid on 4" of bedding sand or pea gravel to support pipe evenly and avoid hubs supporting piping. All installations shall be constructed in an approved manner to the complete satisfaction of the Architect and Plumbing Inspector.
5. All horizontal piping shall be install level.
6. All vertical piping shall be install plumb.
7. Avoid locating any piping over electrical equipment or in elevator equipment rooms.
8. All valves and valve handles shall be install in an accessible location. Valve handles shall operate so that pulling down will close the valve. Space associated piping as required for proper operation.
9. Conceal all piping whenever possible. Bring stub extensions as close to fixtures as possible. Install all piping so that it can be drained, and provide a brass drain plug at low points and at the bottom of risers.
10. All thermometers and pressure gauges shall be located so they can be viewed from the floor.
11. Underground plastic pipe and tubing shall be installed in accordance with ASTM D2774.
12. Contractor shall submit domestic hot water distribution balance report to confirm flow meter setting and temperature outlet at all fixtures.
13. Route hot water return piping within two feet of the plumbing fixtures used for hand washing in accordance with IECC C404.5.1.
14. Provide each balancing valve with a check valve, union and ball valve on the upstream side, unless balancing valve contain these items as integral parts.

C. Installation of Piping within A Plenum Ceiling

- 1 1. Plumbing within the plenum ceiling shall be of non-combustible material
2 or shall have a flame spread index of not more than 25 and a
3 smoke-developed index of not more than 50 when tested in accordance
4 with ASTM E84, CAN/ULC S102.2 or UL 723 with the exception of
5 combustible materials fully enclosed within continuous noncombustible
6 raceways or enclosures, or within materials listed and labeled for such
7 application.

8 D. Electrical Coordination

- 9 1. Provide manufacturer's wiring diagrams to Electrical Contractor for all
10 equipment and devices furnished by this Division's contractor and as
11 indicated to be wired by the Electrical Contractor.

12 E. Testing

- 13 1. All testing that is required for the installation of the system specified shall
14 be done by this Division's contractor prior to painting, backfilling,
15 installation of pipe covering, or concealment within the building
16 construction.
17 2. All tests shall be conducted in the presence of and to the satisfaction of the
18 inspector having jurisdiction.
19 3. Testing shall be conducted in accordance with the Wisconsin Uniform
20 Plumbing Code or as hereinafter specified.
21 4. Repair any leaks that occur during testing, and retested until no leaks
22 occur for the installation of the system specified shall be done by this
23 Division's contractor.
24 5. The system specified shall be tested and proved watertight under a water
25 pressure not less than 150 PSI for a period of two hours.
26 6. All sterilizing shall be conducted in accordance with the Wisconsin
27 Uniform Plumbing Code or as hereinafter specified.

28 3.05 OWNER TRAINING (NONE)

29 3.06 SPARE EQUIPMENT (NONE)

30 END OF SECTION

SECTION 22 12 00

SANITARY DRAIN, WASTE AND VENT SYSTEM

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

- A. Drawings and general provisions of contract, including general and supplemental conditions and Division 01 specification sections, apply to work under this Section.

1.02 DESCRIPTION OF WORK

- A. Furnish and install a complete and operable mechanical system as indicated on the drawings and as specified herein.

B. Materials:

1. Materials shall conform to the standard prescribed in the Wisconsin Uniform Plumbing Code and be approved for use by the Department of Safety and Professional Services, Division of Technical Services. When required, Plumbing Contractor shall obtain approval prior to installation.
2. All materials required for the work shall be new, of first-class quality and shall be furnished, delivered, erected, connected and finished in every detail and shall be so selected and arranged as to fit into the building spaces.

C. Materials Not Included:

1. N/A.

1.03 SHOP DRAWINGS

- A. Submit electronic files with dimensions, capacities, and information as soon as available from manufacturers.

1.04 QUALITY ASSURANCE

- A. All materials and parts shall be new and unused of current manufacture.
- B. Provide all necessary accessories required for a complete and operable system.

1.05 WARRANTY

- A. Materials and workmanship shall be warranted for a period of not less than (1) year from the date of commissioning against defects in material and workmanship.
- B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

- 1 C. The warranty shall not deprive the Owner of other rights the Owner may have
2 under other provisions of the Contract Documents and will be in addition to and
3 run concurrent with other warranties made by the Contractor under the
4 requirements of the Contract Documents.

5 PART 2 PRODUCTS

6 2.01 GENERAL

- 7 A. All materials and equipment furnished shall be current production of
8 manufacturers regularly engaged in the manufacture of such items, and for which
9 replacement parts are available. All materials shall be new (less than 1 year old
10 when turned over to the Owner).

11 2.02 MANUFACTURERS

- 12 A. Category types shall be of the same manufacturer.
13 B. No private label wholesale products will be accepted.

14 2.03 DRAIN, WASTE AND VENT SYSTEMS PIPING

- 15 A. Underground pipes and fittings within the building can be as follows:
16 1. Service weight cast iron conforming to ASTM A74 standards. All cast
17 iron soil pipes and fittings shall be marked with the collective trademark
18 of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF
19 International. Hub and spigot joints shall have neoprene gaskets or No-hub
20 pipe and fittings clamps for underground and above ground installations.
21 No-hub pipe and fittings clamps shall be heavy duty, stainless steel
22 shielded couplings for non-pressure, gravity flow applications only.
23 a. Manufactures shall be Clamp-all - Hi-torq 125, Mission – Heavy
24 Weight or Husky - 4000 series or an equal approved by the
25 engineer.
26 2. Schedule 40 solid wall Poly Vinyl Chloride (PVC) conforming to ASTM
27 D2665 standards for 6” and smaller. The joints and connections method
28 shall be per the manufacturers recommendations.
- 29 B. Above ground pipes and fittings within the building shall be as follows:
30 1. No- hub cast iron conforming to ASTM A74 standards. All cast iron soil
31 pipes and fittings shall be marked with the collective trademark of the Cast
32 Iron Soil Pipe Institute (CISPI) and be listed by NSF International. The
33 joints and connections method shall be per the manufacturers
34 recommendations. No-hub pipe and fittings clamps for underground and
35 above ground installations. No-hub pipe and fittings clamps shall be heavy
36 duty, stainless steel shielded couplings for non-pressure, gravity flow
37 applications only.

- a. Manufactures shall be Clamp-all - Hi-torq 125, Mission – Heavy Weight or Husky - 4000 series or an equal approved by the engineer.
 2. Schedule 40 solid wall Poly Vinyl Chloride (PVC) conforming to ASTM D2665 standards for 6” and smaller. The joints and connections method shall be per the manufacturers recommendations.
 - C. Pipes and fittings in plenums ceiling can be as follows:
 1. Have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.
 2. Wrapped with pipe and fitting insulation conforming to ASTM F2618 standards for installation over Poly Vinyl Chloride (PVC).
 3. Schedule 40 Chlorinated Poly Vinyl Chloride (CPVC) conforming to ASTM F 2618 standards.
- 2.04 TRAPS
- A. Provide deep seal “P” traps per the specified material type.
- 2.05 VENT FLASHINGS
- A. See plumbing drawing’s Pipe Penetration Detail.
 - B. Provide an approved watertight vent flashing where the roof system is penetrated by a vent terminal.
 - C. Vent flashings shall be material approved by the State of Wisconsin Uniform Plumbing Code.
 - D. Vent flashing shall be compatible with the type of roof system used.
 - E. See details on drawings for more information for installation requirements.
- 2.06 HANGERS, ANCHORS AND INSERTS
- A. See plumbing drawing’s Pipe Hangers, Supports and Insulation Detail.
 - B. All piping in the plumbing system shall be supported with hangers in accordance with the provisions of the Wisconsin Uniform Plumbing Code.
 - C. The use of perforated strap hangers will not be acceptable.
 - D. Use approved malleable, wrought iron or steel pipe riser clamps for steel or cast iron pipes and copper plated clamps for copper pipes.
 - E. Provide all necessary inserts for supporting piping and equipment.

1 F. Piping shall be supported with clevis or adjustable band loop hangers at intervals
2 recommended by the manufacturer.

3 G. Provide low compressive insulation protectors on all insulated piping supported
4 by hangers or strut channel. Protective shield material shall be galvanized carbon
5 steel with pre-insulated calcium silicate support blocks.

6 H. Manufacturers shall by B-Line, Anvil, Fee & Mason, Elcen or an equal approved
7 by the engineer.

8 2.07 SUPPORTS

9 A. See plumbing drawing's Pipe Hangers, Supports and Insulation Detail.

10 B. Provide all structural supports required for equipment included under this
11 Division of the Work.

12 C. Structural supports that is required for the installation of the system specified shall
13 be done and repaired by this Division's contractor in coordination with the
14 general contractor and under the direction and to the satisfaction of the Architect
15 and Engineer.

16 2.08 ESCUTCHEONS

17 A. See plumbing drawing's Pipe Penetration Detail.

18 B. Provide on all pipes passing through finished floors, walls and ceilings with
19 outside diameter sufficient to cover sleeve opening and inside diameter to fit
20 snugly around pipe.

21 C. Escutcheon plates shall be chrome plated brass.

22 D. Manufacturers shall by BrassCraft, Dearborn, Keeney, McGuire or an equal
23 approved by the engineer.

24 2.09 ACCESS PANELS

25 A. Access panels shall be sized as required for access the system equipment and
26 parts for maintenances, repair and replacement.

27 B. Access panels shall be keyed with a locking devices.

28 C. Panels shall be installed by this Division's contractor in openings provided by the
29 General Contractor as located and supervised by this Division.

30 D. Manufacturers shall be by KARP and Associates, Milcor, Titus or an equal
31 approved by the engineer.

32 2.10 VALVE AND PIPE IDENTIFICATION

- A. All equipment, pipe and valves, etc., shall be identified as listed below.
- B. All piping in this Division of the Work exposed, in access spaces or above ceilings shall be identified at minimum of 25' intervals and at least once in every room with W.H. Brady Co., Seton, or equal, pipe marking labels, 2¼" color as required by A.N.S.I. standards.
- C. Sprayed on pipe stencils letterings are not allowed.
- D. Valve tags shall be 1 1/8" round brass tags with black numerals. Fasten tags to body of valves with copper or brass chain. Numerals on tags shall correspond to the record drawings.
- E. Equipment and starters shall be identified with neat, clear, permanent labels.
- F. Charts:
 - 1. Furnish three (3) charts listing all valves, giving their location in the building and describing the valve number, service, function, normal position, etc. One (1) chart encased in plastic to be mounted in the building maintenance office and the other two (2) charts delivered to the Architect for transmittal to the Owner.
 - 2. Furnish one (1) overall floor plan showing the location of all water distribution valves and the corresponding number from the valve chart.

2.11 PIPE SLEEVES

- A. See plumbing drawing's Pipe Penetration Detail.
- B. Provide sleeves for pipes passing through masonry or concrete walls and floors, seal all openings between pipe and sleeve with vinyl acrylic plastic. For piping passing through fire walls, floors or ceilings, use 3-M Fire Barrier CP-25 caulk and 303 putty synthetic elastomers, U.L. rated.
- C. Sleeves for pipes passing through floors outside of chases shall be constructed of schedule 40 galvanized steel pipe ½" larger than pipe or pipe covering and shall extend ½" above finished floors.
- D. Provide 20 gauge galvanized iron sleeves 1" larger than the outside diameter of pipe or insulation and of sufficient length to pass through walls, partitions, etc., for piping exposed to view.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Field verify that all equipment and fixtures are in compliance with approved submittal drawings.

3.02 FIELD MEASUREMENTS

- A. Field verify all measurements. Do not scale off of drawings.
- B. Identify conflicts with the work of other trades prior to the start of any work.
- C. Adjust system as required field requirements.

3.03 DELIVERY, STORAGE AND HANDLING

- A. Receive, sign for and store all equipment in this section.
- B. Maintain original quality and condition of equipment while it is in storage.

3.04 INSTALLATION

A. Excavation and Backfill

1. Excavating and backfill as defined in Section 31 23 00 takes precedence over statements made in this section should any conflicts occur.
2. Contact public utilities and the building's maintenance personnel to determine locations of their underground installations and avoid conflict therewith. Underpin and support all lines. Cut off service connections encountered which are to be removed at the limits of fire excavation and cap. In the event relocation of plumbing utility services is necessary to avoid this conflict, the Architect and Engineer shall be consulted.
3. Make all necessary excavations for plumbing utility services, system piping and equipment. Excavate to bottom of pipe and structure bedding, 4" in stable soils 6" in rock or wet trenches and 8" in unstable soil. Finish bottoms of excavations to true, level surface.
4. At no time place excavated materials where it will impede surface drainage unless such drainage is being safely rerouted away from the excavation or work of other trades.
5. Excavate whatever materials are encountered as required to place at the elevations as shown on drawings. Remove debris and rubbish from excavations before placing bedding and backfill material.
6. Provide and maintain all fencing, barricades, signs, warning lights, and/or other equipment as required around all excavation areas at all times. No excavation shall be left unattended without adequate protection.
7. Elevations shown on the plans are subject to such revisions as may be required to fit field conditions.
8. Install piping passing under foundations with minimum of 1 ½" clearance to concrete and insure there is no disturbance of bearing soil. Care must be taken in excavation that the walls and footings will not be disturbed in any way.
9. Excavated materials from areas under building construction shall be removed from the site unless otherwise noted.

1 B. Bedding:

- 2 1. Bedding material shall be thoroughly compacted sand, peal gravel or 3/8”
3 crushed stone chips.
4 2. Bedding material depth shall be a minimum of 4” from the bottom of
5 excavated trench to bottom of pipe.
6 3. Bedding material shall extend up from the bottom of the pipe to the pipe’s
7 centers spring-line.
8 4. Verify will pipe manufacturer’s recommendation and requirements.
9 5. See ASTM D2321 Standard Practice for underground Installation of
10 Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications for
11 more information.

12 C. Backfill:

- 13 1. Initial backfill material shall be sand, peal gravel or 3/8” crushed stone
14 chips.
15 2. Initial backfill material depth shall be a minimum from the pipe’s centers
16 spring-line to 8” above the top of the pipe.
17 3. Final backfill shall be clean crushed bank run sand or peal gravel, gravel
18 or soil / dirt is acceptable above the initial backfill requirements. Place
19 final backfill in layers not more than 8” in loose depth, compacting each
20 layer to required maximum density. Do not place final backfill material on
21 surfaces that are muddy, frozen, or contain ice or frost. All final backfill
22 materials shall be vibrator compacted.
23 4. Place and compact acceptable final backfill materials in layers to required
24 elevations. Final backfill materials shall be free of clay, rock debris,
25 vegetable matter, waste and frozen materials. Use sub-base material
26 where indicated under piping or conduit; shape to fit bottom 90 degrees of
27 cylinder.
28 5. Verify will pipe manufacturer’s recommendation and requirements.
29 6. See ASTM D2321 Standard Practice for underground Installation of
30 Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications for
31 more information.

32 D. Compaction:

- 33 1. Compact each layer of backfill to 90% maximum density for cohesive
34 soils and 95% relative density for cohesion less soils; at lawns or unpaved
35 areas, 85 maximum density for cohesive soils and 90% relative density for
36 cohesion less soils or requirements of Section 31 23 00 which takes -
37 precedence if requirements are stricter.
38 2. Perform and pay costs of field density tests in accordance with Section 31
39 23 00 of the specifications.

40 E. Surface Restoration:

1. Completely restore the surface of all disturbed areas to a like condition of the surface prior to the work. Level off and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment. Replacement of all existing areas removed to install piping by Plumbing Contractor must be replaced to match existing.

F. Sheeting, Shoring and Bracing:

1. Provide shoring, sheet piling and bracing in conformance with the Wisconsin Administrative Code to prevent earth from caving or washing into the excavated earth. Shore and underpin to properly support adjacent or adjoining structures. Abandon in place shoring, sheet piling and underpinning below the top of the pipe, or if approved, in advance by the engineer, maintained in place until other permanent support approved by the engineer is provided.

G. Dewatering:

1. Provide, operate and maintain all pumps and other equipment necessary to drain and keep all excavation pits, trenches and the entire subgrade area free from water under all circumstances.

H. Rock Excavation:

1. Remove rock encountered in the excavation to a minimum density of six (6) inches outside the pipe. Rock excavation includes all hard, solid rock in ledges, bedded deposits and unstratified masses, all natural conglomerate deposits so firmly contented as to present all the characteristics of solid rock; which material is so hard or so firmly cemented that in the opinion of the Engineer it is not practical to excavate and remove same with a power shovel except after thorough and continuous drilling and blasting. Rock excavation includes rock boulders of 2 cubic yard or more in volume.
2. Rock excavation will be computed on the basis of the depth of rock removed and a trench width two (2) feet larger than the outside diameter of the pipe where one (1) pipe is laid in the trench and three (3) feet larger than the combined outside diameter where two (2) pipes are laid in the trench. Include 6" pipe and structure bedding in rock excavation. Include rock excavation shown on the plans in the Base bid.

I. Cutting and Patching

1. All existing concrete floor / wall cutting and material removal that is required for the installation of the system specified shall be done and repaired by this Division's contractor in coordination with the general contractor and under the direction and to the satisfaction of the Architect and Engineer. No cutting of structural work shall be done without the written consent of the Architect and Engineer, and all such work shall be done in accordance with their directions and supervision.

2. Holes cut through precast concrete floors / walls shall be rotary or core drilled per the manufacturer's recommendations.
3. All concrete floor / wall patching and refinishing that is required for the installation of the system specified shall be done by this Division's contractor in coordination with the general contractor and under the direction and to the satisfaction of the Architect and Engineer.
4. Replacement of all existing areas removed to install piping by this Division's contractor must be replaced to match existing surrounding surface.

J. Installation

1. All installation as be installed per the local and state of Wisconsin Uniform Plumbing code.
2. Verify existing and proposed pipe connection elevations and locations in the field and notify the Architect and Engineer, in writing, of any variances prior to the start of any work.
3. Underground piping shall be laid on 4" of bedding sand or pea gravel to support pipe evenly and avoid hubs supporting piping. All installations shall be constructed in an approved manner to the complete satisfaction of the Architect and Plumbing Inspector.
4. Connections at the base of all stacks or vertical pipes shall be made with long sweep 1/4 bends, two 1/8 bends, or a "Y" and 1/8 bend combination. All changes in direction of drain or waste pipe shall be made by means of suitable bends, and where possible, "Y" and 1/8 bend combinations shall be used instead of quarter bends.
5. All horizontal sanitary drain and waste piping 2" and smaller shall have a slope of 1/4" per foot and 3" and shall have a slope of 1/8" per foot, unless otherwise noted on drawing.
6. Vent terminals shall penetrate the roof system of a building full size, but not less than 3" in diameter.
7. Vent terminals shall be a minimum of 10 feet away from any HVAC roof equipment's fresh air in-take or any operable windows or doors.
8. All horizontal vent piping must be installed so as to be drained back to associated drain or waste piping.
9. All vertical piping shall be installed plumb.
10. Avoid locating any piping over electrical equipment or in elevator equipment rooms.
11. Cleanouts shall be provided 28" to 30" above the base of every drain or waste stack, wherever there is a change in direction of run of piping, and elsewhere as may be shown on the drawings or required by the Wisconsin Uniform Plumbing Code.
12. Cleanouts access covers shall be extended to the surrounding finish surface of floors and walls as scheduled on the drawings. Cleanouts shall be installed as show on drawing, while providing the required clearances for proper operation.

K. Installation of Plastic Piping

1. Installation of plastic piping through fire rated walls and ceilings must comply with the standards of the Wisconsin Administrative Code. Plastic piping may not be installed in fire rated walls or ceiling plenums except as noted in paragraph 3.4/M.
2. Tremco Brand Fire Barrier Penetration Sealing Systems may be used where plastic piping penetrates fire rated walls and floors. Sealants shall be installed per manufacturer's recommendations and by trade's people familiar with the products. Approval of the local authorities must be obtained before any installation of this product is accepted.

L. Installation of Piping within A Plenum Ceiling

1. Plumbing within the plenum ceiling shall be of non-combustible material or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E84, CAN/ULC S102.2 or UL 723 with the exception of combustible materials fully enclosed within continuous noncombustible raceways or enclosures, or within materials listed and labeled for such application.

M. Testing

1. All testing that is required for the installation of the system specified shall be done by this Division's contractor prior to painting, backfilling, installation of pipe covering, or concealment within the building construction.
2. All tests shall be conducted in the presence of and to the satisfaction of the inspector having jurisdiction.
3. Testing shall be conducted in accordance with the Wisconsin Uniform Plumbing Code or as hereinafter specified.
4. Repair any leaks that occur during testing, and retested until no leaks occur for the installation of the system specified shall be done by this Division's contractor.
5. The system specified shall be tightly closed and filled with water to the highest opening. The water shall be kept in the system for at least 15 minutes before inspections start. An air test of 5 pounds per square inch for a period of 15 minutes is also acceptable. The smoke test does not take the place of the water or air test.

3.05 OWNER TRAINING (NONE)

3.06 SPARE EQUIPMENT (NONE)

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 GENERAL

1.01 APPLICABLE PROVISIONS

- A. Drawings and general provisions of contract, including general and supplemental conditions and Division 01 specification sections, apply to work under this Section.

1.02 DESCRIPTION OF WORK

- A. Furnish and install a complete and operable plumbing system as indicated on the drawings and as specified herein.
- B. Provide and install plumbing fixtures where shown on the drawings, scheduled and as hereinafter specified.
- C. All plumbing fixtures installed for this project shall comply with the State of Wisconsin Uniform Plumbing Code chapter SPS384.
- D. All faucets shall be constructed from a lead-free brass alloy, and where used in drinking water applications, shall be certified to be NSF61, Section 9 compliant.

1.03 SHOP DRAWINGS

- A. Submit electronic files of drawings with dimensions, capacities, and information as soon as available from manufacturers.

1.04 QUALITY ASSURANCE

- A. All materials, equipment, and parts shall be new and unused of current manufacture.
- B. Provide all necessary accessories required for a complete and operable system.

1.05 WARRANTY

- A. Materials and workmanship shall be warranted for a period of not less than 1 year from the date of commissioning against defects in material and workmanship.
- B. The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

- 1 C. The warranty shall not deprive the Owner of other rights the Owner may have
2 under other provisions of the Contract Documents and will be in addition to and
3 run concurrent with other warranties made by the Contractor under the
4 requirements of the Contract Documents.

5 PART 2 PRODUCTS

6 2.01 GENERAL

- 7 A. All materials and equipment furnished shall be current production of
8 manufacturers regularly engaged in the manufacture of such items, and for which
9 replacement parts are available. All materials shall be new (less than 1 year old
10 when turned over to the Owner).

11 2.02 MANUFACTURERS

- 12 A. See plumbing drawings schedules sheet(s) for more information of specified
13 manufacture, model and acceptable alternates.

- 14 B. Category types shall be of the same manufacturer.

- 15 C. See plumbing drawings schedules sheet(s) for more information of specified
16 fixtures, colors and finishes.

- 17 D. No private label wholesale products will be accepted.

18 2.03 PLUMBING FIXTURE LIST

- 19 A. Other-type Equipment: Other-type of equipment shall be furnished by the Owner.
20 Plumbing Contractor shall install and make final waste and water connections.
21 Discharge waste to sanitary system via air gap fitting as required per
22 manufacturer's requirements. Provide backflow protection, water hammer arrestor
23 on water supply with shutoff valve as required per manufacturer's requirements.
24 Other-type of equipment shall be level.

25 PART 3 EXECUTION

26 3.01 EXAMINATION

- 27 A. See contract drawings for more information.

28 3.02 FIELD MEASUREMENTS

- 29 A. Field verify all measurements. Do not base on contract drawings.
30 B. Identify conflicts with the work of other trades prior to installation of work.
31 C. Adjust system to satisfy field requirements.

1 3.03 DELIVERY, STORAGE AND HANDLING

2 A. Receive, sign for and store all equipment in this section.

3 B. Maintain original quality and condition of equipment while it is in storage.

4 3.04 INSTALLATION

5 A. General

- 6 1. Install the fixtures shown on the plumbing drawings per this Division
7 specifications.
- 8 2. Install all products per manufacturer's specifications, requirements and
9 recommendations.
- 10 3. See drawings for more information.
- 11 4. All fixtures shall be set in a firm and level manner with connection to
12 drain, waste, vent, and water supply pipes per manufacturer's
13 specifications. Adjust all valves, water flow as required for proper
14 operating per manufacturer's specifications, pack all stuffing boxes and
15 leave work area in a finished, clean and satisfactory working condition.
- 16 5. Protect all fixtures after they are installed. This Division of the Work is
17 responsible for them until the acceptance of the work, at which time all
18 fixtures shall be in satisfactory condition and in complete working order.
19 Strictly advise all other Divisions with signs, protective plastic wrapping
20 or coverings to prevent in under authorized usage.
- 21 6. All bolting and fastening to walls, etc., must be with through type toggles
22 and washer bolting. No screw and plug or expansion shield fastenings will
23 be accepted. All fixture fastenings shall be made with steel bar supports
24 and plates or other approved method.
- 25 7. Wall mounted fixtures shall be rigidly supported by a concealed carrier
26 which is firmly attached to structurally sound floor. Occupant loads from
27 the fixture's use shall not be transmitted to the fixture connections or any
28 other part of the plumbing system. Install bolts in hole provided in bottom
29 rear of fixture to prevent lifting and sliding movements of the fixture.
- 30 8. Wall mounted fixtures shall be rigidly supported by a concealed hanger
31 which is firmly attached to structurally sound stubs or wall. Occupant
32 loads from the fixture's use shall not be transmitted to the fixture
33 connections or any other part of the plumbing system. Install bolts in hole
34 provided in bottom rear of fixture to prevent lifting and sliding movements
35 of the fixture.
- 36 9. Floor mounted fixtures shall be firmly set to structurally sound finish
37 floor. Occupant loads from the fixture's use shall not be transmitted to the
38 fixture connections or any other part of the plumbing system. Install bolts
39 in hole provided in fixture to prevent lifting and sliding movements of the
40 fixture.
- 41 10. Top mounted drop-in fixtures shall be firmly set in place with 100% clear
42 mildew-resistant silicone caulk.

11. Under mounted suspended fixtures shall be firmly set in place with 100% clear mildew-resistant silicone caulk.
12. Seal all openings between floors, walls and fixtures with a 100% mildew-resistant silicone caulk. Caulk shall be white for white fixtures and clear for colored fixtures.

B. Floor, Wall and Pipe Cleanouts

1. Cleanouts shall be accessible for normal operation.
2. Floor cleanouts shall be set level and be flush with the adjacent finished floor.
3. Wall cleanouts inside cover plate shall be flush with the adjacent finished wall.
4. Wall cleanouts shall be located below ADA grab bars.
5. Pipe cleanouts shall match the piping system material.
6. See plumbing fixture schedule for more information.

C. Floor, Sink and Hub Drains

1. Drains shall have "P" trap same size as drain outlet.
2. Drain shall be set level and at height to allow proper pitch of floors toward drain as required.
3. See plumbing fixture schedule for rim height elevations.
4. Provide safing material and installation shall conform to SPS384(4)9.

D. Water Closets

1. Water closets shall be set level and rigidly supported. Carriers shall be used for all wall mount and wall outlet type fixtures.
2. Waste pipe connection shall be made with a wall or floor flange by means of a neoprene gasket or wax ring.
3. Waste connection shall have a gas and water tight seal.
4. Water pipe wall stub out rough-in shall be made with the appropriate dimension which will allow the supply tube riser to be installed straight and a minimum of two 45 degree vertical offsets made with bending tool.
5. Water pipe wall stub out that is exposed to occupant use shall be rigid chrome plate brass.
6. Water connections shall have a water tight seal.
7. Flush valves shall operation per the gallons per flush per the fixture schedule.

E. Urinals:

1. Urinals shall be set level and rigidly supported. Carriers shall be used for all wall mount and wall outlet type fixtures.
2. Waste pipe wall stub out rough-in for ADA applications shall be made with the appropriate dimension.
3. Waste pipe wall stub out rough-in for Non-ADA applications shall be made with the appropriate dimension.
4. Waste connection shall have a gas and water tight seal.

5. Water pipe wall stub out rough-in shall be made with the appropriate dimension.
6. Water pipe wall stub out that is exposed to occupant use shall be rigid chrome plate brass.
7. Water connections shall have a water tight seal.
8. Flush valves shall operation per the gallons per flush per the fixture schedule.

F. Lavatories

1. Lavatories shall be set level and rigidly supported. Carriers shall be used for all wall mount and wall outlet type fixtures.
2. Waste pipe wall stub out rough-in for ADA applications shall be made with the appropriate dimension which will allow the p-trap to set parallel with wall allowing space for the offset tail piece to be perpendicular with wall without any offsets.
3. Waste pipe wall stub out rough-in for Non-ADA applications shall be made so that the p-trap is perpendicular with wall without any offsets.
4. Waste pipe wall stub out shall have an escutcheons that is tightly fitted over pipe serving the fixture.
5. Waste pipe wall stub out that is exposed to occupant use shall be rigid chrome plate brass.
6. Waste pipe wall stub out inside of case work shall be rigid chrome plate brass.
7. Waste p-traps shall be rigid chrome plate minimum 17 gauge brass having slip joint connection nuts with bottom dip cleanouts.
8. Waste tail piece shall be rigid chrome plate minimum 17 gauge brass having slip joint connection nuts.
9. Waste connection, p-trap and tail piece shall have a gas and water tight seal.
10. Water pipe wall stub out rough-in shall be made with the appropriate dimension which will allow the supply tube riser to be installed straight and a minimum of two 45 degree vertical offsets made with bending tool.
11. Water pipe wall stub out that is exposed to occupant use shall be rigid chrome plate brass.
12. Water pipe wall stub out inside of case work shall be rigid chrome plate brass.
13. Waste supply shut-off valve be rigid chrome plate brass with quarter turn stem, no plastic, with brass feral and compression connection nut.
14. Water supply tube riser shall be rigid chrome plate brass with compression connection nut. Stainless steel flexible braided supply tubes are not acceptable.
15. Water connections, supply shut-off valve and supply tube riser shall have a water tight seal.
16. Faucets shall operation per the gallons per minute per the fixture schedule.
17. Exposed low voltage wires shall be enclosed in chrome plated rigid wire covers.

1 G. Sinks

- 2 1. Sinks shall be set level and rigidly supported.
- 3 2. Waste pipe wall stub out rough-in for ADA applications shall be made
- 4 with the appropriate dimension which will allow the p-trap to set parallel
- 5 with wall allowing space for the offset tail piece to be perpendicular with
- 6 wall without any offsets.
- 7 3. Waste pipe wall stub out rough-in for Non-ADA applications shall be
- 8 made so that the p-trap is perpendicular with wall without any offsets.
- 9 4. Waste pipe wall stub out shall have an escutcheons that is tightly fitted
- 10 over pipe serving the fixture.
- 11 5. Waste pipe wall stub out that is exposed to occupant use shall be rigid
- 12 chrome plate brass.
- 13 6. Waste pipe wall stub out inside of case work shall be rigid chrome plate
- 14 brass.
- 15 7. Waste p-traps shall be rigid chrome plate minimum 17 gauge brass having
- 16 slip joint connection nuts with bottom dip cleanouts.
- 17 8. Waste tail piece shall be rigid chrome plate minimum 17 gauge brass
- 18 having slip joint connection nuts.
- 19 9. Waste connection, p-trap and tail piece shall have a gas and water tight
- 20 seal.
- 21 10. Water pipe wall stub out rough-in shall be made with the appropriate
- 22 dimension which will allow the supply tube riser to be installed straight
- 23 and a minimum of two 45 degree vertical offsets made with bending tool.
- 24 11. Water pipe wall stub out that is exposed to occupant use shall be rigid
- 25 chrome plate brass.
- 26 12. Water pipe wall stub out inside of case work shall be rigid chrome plate
- 27 brass.
- 28 13. Waste supply shut-off valve be rigid chrome plate brass with quarter turn
- 29 stem, no plastic, with brass feral and compression connection nut.
- 30 14. Water supply tube riser shall be rigid chrome plate brass with compression
- 31 connection nut. Stainless steel flexible braided supply tubes are not
- 32 acceptable.
- 33 15. Water connections, supply shut-off valve and supply tube riser shall have
- 34 a water tight seal.
- 35 16. Faucets shall operation per the gallons per minute per the fixture schedule.
- 36 17. Exposed low voltage wires shall be enclosed in chrome plated rigid wire
- 37 covers.

38 H. Electric Water Coolers

- 39 1. Electric Water Coolers shall be set level and rigidly supported. Carriers
- 40 shall be used for all wall mount and wall outlet type fixtures.
- 41 2. Waste pipe wall stub out rough-in for ADA applications shall be made
- 42 with the appropriate dimension which will allow the p-trap to set parallel
- 43 with wall allowing space for the offset tail piece to be perpendicular with
- 44 wall without any offsets.
- 45 3. Waste pipe wall stub out rough-in for Non-ADA applications shall be
- 46 made so that the p-trap is perpendicular with wall without any offsets.

4. Waste pipe wall stub out shall have an escutcheons that is tightly fitted over pipe serving the fixture.
5. Waste pipe wall stub out that is exposed to occupant use shall be rigid chrome plate brass.
6. Waste pipe wall stub out inside of case work shall be rigid chrome plate brass.
7. Waste p-traps shall be rigid chrome plate minimum 17 gauge brass having slip joint connection nuts with bottom dip cleanouts.
8. Waste tail piece shall be rigid chrome plate minimum 17 gauge brass having slip joint connection nuts.
9. Waste connection, p-trap and tail piece shall have a gas and water tight seal.
10. Water pipe wall stub out rough-in shall be made with the appropriate dimension which will allow the supply tube riser to be installed straight and a minimum of two 45 degree vertical offsets made with bending tool.
11. Water pipe wall stub out that is exposed to occupant use shall be rigid chrome plate brass.
12. Water pipe wall stub out inside of case work shall be rigid chrome plate brass.
13. Waste supply shut-off valve be rigid chrome plate brass with quarter turn stem, no plastic, with brass feral and compression connection nut.
14. Water supply tube riser shall be rigid chrome plate brass with compression connection nut. Stainless steel flexible braided supply tubes are not acceptable.
15. Water connections, supply shut-off valve and supply tube riser shall have a water tight seal.
16. Faucets shall operation per the gallons per minute per the fixture schedule.

I. Barrier Free Requirements

1. General:
 - a. All barrier free requirements shall comply with ADA Standards for accessible Design per USDOJ, ICC/ANSI A117.1 requirements and Wisconsin Building Code requirements.
 - b. All barrier free requirements shall comply with Architectural drawings heights for children.
2. Water Closets:
 - a. Adult bowls shall be elongated with the rim height of 17" to 19" to the top of the toilet seat from finished floor. Adult flush controls shall be hand operated mounted on the wide side of the water closet or automatic sensor type not exceeding 30" above the finished floor.
3. Urinals:
 - a. Adult urinals shall be elongated with a rim height not exceeding 17" above the finished floor. Adult flush controls shall be hand operated or automatic sensor type not exceeding 48" above the finished floor.
4. Lavatories:

- a. Adult basins shall be mounted with the rim or counter surface not exceeding 34" above the finished floor and shall have a 29" clearance between finished floor and the bottom of the apron. Hot water supply and drain waste p-traps pipes under lavatories shall be insulated or otherwise configured to protect against contact and there shall be no sharp or abrasive surfaces under lavatories. Faucets shall have hand operated lever type, push metering type or automatic sensor type. Faucet operated with push metering type or automatic sensor type shall remain open at least 10 seconds.

5. Electric Water Coolers:

- a. Spouts height not exceeding 36" above the finished floor. Wall and post mounted cantilevered units shall have a clearance of 27" from the bottom of the apron to finished floor. Self-contained units shall have a clear floor space at least 30" x 48" for a parallel wheelchair approach. Controls shall be front mounted or side mounted near the front edge.

6. Sinks:

- a. Adult basins shall be mounted with the rim or counter surface not exceeding 34" above the finished floor and shall have a 29" clearance between finished floor and the bottom of the apron. Hot water supply and drain waste p-traps pipes under lavatories shall be insulated or otherwise configured to protect against contact and there shall be no sharp or abrasive surfaces under lavatories. Faucets shall have hand operated lever type, push metering type or automatic sensor type. Faucet operated with push metering type or automatic sensor type shall remain open at least 10 seconds.

J. Electrical Coordination

1. Provide manufacturer's wiring diagrams to Electrical Contractor for all equipment and devices furnished by this Division's contractor and as indicated to be wired by the Electrical Contractor.

K. Testing

1. All testing that is required for the installation of the fixtures specified shall be done by this Division's contractor prior to final inspection by the architect / engineer.
2. All tests shall be conducted in the presence of and to the satisfaction of the inspector having jurisdiction.
3. Testing shall be conducted in accordance with the Wisconsin Uniform Plumbing Code or as hereinafter specified.
4. Repair any leaks that occur during testing, and retested until no leaks occur for the installation of the system specified shall be done by this Division's contractor.
5. The fixtures specified shall be tested and proved watertight for normal operations per manufacturer's requirements.

3.05 OWNER TRAINING

1 A. Provide minimum of one hour(s) training on each type of fixtures and its
2 operation and repair.

3 3.06 SPARE EQUIPMENT (NONE)

4 END OF SECTION

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